The Engineering and Mining Journal

VOL. LXXXII. NEW YORK, SEPTEMBER 22, 1906. NO. 12.

Published Weekly at
505 PEARL STREET, NEW YORK
London Office: 20 Bucklersbury, London E. C., Eng.
Cable Address "Engminjour, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.

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The Engineering and Mining Journal.

Entered at New York Post Office as mail matter of the second class.

During 1905 The Engineering & Mining Journal *printed and circulated* 454,250 *copies, an average of* 8735 *per issue. Of this issue* 8000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Manufacture of Sulphuric Acid in Florida.

SPECIAL CORRESPONDENCE.

On account of transportation difficulties, sulphuric acid is manufactured, if practicable, on the spot where it is to be used. As is well known, phosphate rock, in the production of which Florida has for several years led the world, is an important ingredient of manufactured fertilizers, and must be treated with sulphuric acid to render the phosphorus available as plant food. Since the consumption of acid is considerable, a large quantity of that chemical must be kept within easy reach. This paper describes a new acid plant constructed as a source of supply for two fertilizer manufactories recently erected near Jacksonville.

The two plants referred to are those of the Wilson & Toomer Fertilizer Company, a local concern, and Armour & Co., of Chicago. The plants are located on the west bank of the St. John's river, just below Jacksonville, and within an eighth of a mile of each other. One acid factory supplies both fertilizer companies, and this is the property of Wilson & Toomer.

The acid is manufactured by the chamber process, and the design includes some of the latest features of construction. Two banks of 11 furnaces each, arranged back to back, are used for burning the lump ore, which is broken and screened to hen's egg size. Each furnace burns 1000 lb. of Spanish pyrites per 24 hours, the total capacity of the lump burners being 22,000 lb. per day. For burning the fines, a Herreshoff furnace has been installed. This burns 5000 lb. per 24 hours, bringing the grand total of mineral burned to 27,000 lb. per day. The gases pass from the burners over the usual niter pots, thence up the Glover tower to the chambers, of which there are four, viz., two 100 ft. long by 25 ft. wide by 20 ft. high, and two of the same hight and width, but only 70 ft. long. The total chamber space is 85,000 cu.ft. Between each two successive chambers there is an intermediate column, whose chief function is to cause intimate mixture of the gases. For the control of the process, each chamber is supplied with the usual appliances for taking temperature observations and "curtain drip" samples. From the fourth chamber the gases pass through two Gay-Lussac towers.

The mineral burned is Spanish pyrites, carrying about 50 per cent. sulphur, and a small amount of copper. The efficiency of the burners is good, analysis of the cinder showing less than 1 per cent. sulphur. The consumption of niter is about 4 per cent. of the consumption of sulphur; i.e., 20 lb. of niter is added each hour, as against 1000 lb. of pyrites. The life of the niter pots is short, being only about three months. The lump burners are charged in succession, one at a time, an hour and five minutes apart, the circuit thus being completed in two shifts of 12 hours each.

The gases from the burners contain from 6 to 7 per cent. SO_2 and enter the Glover tower at 600 to 700 deg. F. The temperature in the first chamber is normally 220 deg. F., gradually decreases through the four chambers, and enters the first Gay-Lussac tower at 105 deg. F. The steam pipes enter the chambers through the end, near the roof, and steam is blown in at 40 lb. pressure.

For pumping the acid, four acid eggs are used. One egg pumps from the acid works to a tank in the fertilizer factory; a second pumps to the plant of Armour & Co. The two other eggs force acid to the tops of the towers. The output of the plant is 31 tons of 50-deg. acid per day, or about 4½ times the weight of sulphur burned.

The principal materials used in the manufacture of the fertilizer are kainite, potash salts (imported from Germany), phosphate rock, and dried blood and ground bone from slaughter houses. It is noteworthy that for the manufacture of the product the mining industry furnishes three of the raw materials.

Familiarity with some telegraphic code, Morse or otherwise, would often facilitate rescue work in mines.

Tin Mining in the Federated Malay States.*

The acting Senior Warden gives the total mining revenue derived from all sources as $9,689,501, against $9,249,189 for 1904. Of the total amount collected the export duty on tin accounted for $9,249,627, an increase as compared with 1904 of $434,939; the export duty on wolfram yielded $2213; and the royalty on gold produced only $11,439, as compared with $28,148 in 1904.

The output of tin was 856,660 piculs, a decrease of 12,468 piculs from 1904; 548,371 piculs of the total output were exported in the form of tin ore and 308,289 piculs as block tin. The quantities and values of the tin exported from the various States were as follows:

	Piculs.	Value.
Perak	446,781	$36,086,512
Selangor	289,867	23,412,558
Negri Sembilan	85,133	6,876,192
Pahang	34,879	2,81[illegible]166

The market was subject to less fluctuation in 1905 than during 1904, the highest figure reached having been $88.75 and the lowest $76. The average rate of exchange was higher, and thus the value in sterling of the output amounted to the very large sum of £7,063,407, being at the rate of £138 10s. 5d. a ton.

The acting Senior Warden sees no cause for alarm in the decreased output, and is of opinion that no evidence is forthcoming to show that the stanniferous deposits of the country are nearing exhaustion.

The number of men employed directly and indirectly in tin mining is estimated at 230,000, divided as follows: Contract laborers 63,590; on wages 30,472; on tribute 114,952; this being an increase of 16,353 over 1904. The output of tin for each laborer employed in mining is calculated to have been 4.09 piculs, of an estimated value of $331, against 4.44 piculs, value $340, in 1904, and 4.50 piculs, value $376, in 1903. As engine power and labor-saving appliances were made use of to a greater extent than in preceding years, this result is not regarded as satisfactory.

Experiments on the comparative strength of cast-iron test bars when the metal was run hot into the mold and when the bars were run with metal kept in ladle till it would just still run and fill the mold, showed that as to ultimate strength, there was no appreciable difference between the hot- and dull-run bars, but the deflection was noticeably less in the latter; that is to say, the dull-run bar was as strong as the hot-run one, but much stiffer.

*From the Annual Report for 1905, by Sir William Taylor, Resident General.

Mine Accounting at Mineville, N. Y.

BY A. E. HODGKINS.*

The first and one of the most important steps in gathering the data for cost accounting is the accurate taking of time and its distribution. This is done at Mineville in the following manner: There is a timekeeper for each shift, who goes underground and takes the time twice on each shift, and the same is done on the surface. All of the employees are known by number, each one showing his brass check to the timekeeper, and he in turn enters it in his time book under the proper classification of the cost accounts. Each day this record is transferred to the payroll book, having all the numbers in consecutive order, and the time is spread on the roll regardless of where the man was working, simply showing the number of days and the rate per day, so that it facilitates the work when closing the pay roll for pay day.

POWER DRILL WORK.

.....SHIFT. .....MINE. DAILY REPORT. 190

Check No.	Name of Runner.	No. of Drill	Hours Run	Amount Drilled Inches.										Total Inches	Total Feet	Total In.

.....Foreman.

REPORT 1.

The drill runners' reports (see report 1) are turned in each day by the shift boss, and the record of the footage drilled is entered in a book used for that purpose, so that when it comes time for pay day his total footage is taken and paid for at a flat rate per foot, deducting only the helper's time, the balance being the drill runner's earnings for the month.

Trammers are all paid by contract at so much per ton, taken from the actual railroad weights.

The shops (see report 2) are handled on a card system, each shop reporting daily to the general office the work done and time consumed on same, which is entered in a book kept for that purpose, and at the end of the month the operating and general accounts are charged with the proportion of work done for them.

The next step, and a very important one, is the method employed for issuing supplies. The warehouseman has no authority to give out supplies to anyone without a written order (see form 3) by the various foremen in charge of work. Supplies are charged to the operating accounts the same as the labor clasifications, so that the two combined show the total cost for each cost account monthly.

MACHINE SHOP.

Name..... .....190.....

NO. HOURS	DESCRIPTION OF WORK	FOR WHOM

Correct..... .....Foreman.

REPORT 2.

We have now arrived at the point where the labor and supplies are to be brought together. This is done by entering the labor and supplies recapitulation sheets on a loose-leaf ledger sheet (see form 4). By adding the month's work to the previous total on each sheet, we have the total cost to date for each classification of cost accounts, and from here it is transformed to the mines and mill cost sheets (see forms 5 and 7).

On form 5 the items are classified under: Mining expense, which is divided into stoping; development in ore; picking and storing rock; tramming; mining captains; shift bosses and time-keepers; cage and skip tenders; underground tracks and cars; pumping; development in rock; mine exploration; underground expense. Surface expense, divided into hoisting; top landing and tramming; stocking and sorting ore; loading ore at pockets; railroad tracks and yards; crushing ore; mining engineer; analysis; office expense; warehouse; contributions; personal injuries; surface expense. The totals of each class are figured separately and further divided into cost of production and percentage. Further items are: Depreciation, divided into inventory, improvement and new construction. Loading and shipping, divided into loading by hand and loading by steam shovel, the weights being given in tons. Fixed charges are added as added expense, divided into taxes and liability insurance. Each classification is totaled separately, and the totals added, after which the summary shown in the form is made out.

Joker Mine..... 190

Received from Supply Clerk the following:

ARTICLES	FOR

No Supplies to be issued without receipt being properly signed.

Received.....

Approved..... Foreman.

FORM 3.

Form 7 is much like form 6, only the items of classification are, necessarily, different. They are classified under concentrating expense, divided into crushing ore; dryers; separators, B and N, tons; separators, type F, tons; separators, tons; power; haulage expense; tower screens; lubricating machinery; millmen; foremen and time-keepers. Under mill expense, divided into superintendent; general mill expense; loading concentrate at pockets; building repairs; conveyor belts; driving belts; stocking ore; railroad tracks and yards; analysis; office expense; warehouse; contributions; personal injuries; surface expense; switching charges; car repairs; royalty; and both totaled separately, the total being divided, as before, into cost of separation and per cent.

Further items are classified under by-products, divided into separator, type E; loading apatite; and loading tailings; all in tons. Depreciation, and loading and shipping, divided as for form 5; and added expense, divided as for form 5, with the addition of fire insurance. The classes are totaled, as before, separately, and the sum total is divided into total cost to concentrate, cost of crude ore to mill, and total cost.

The cost sheet gives the cost for the month, last month, year and previous year, and at the bottom of each cost sheet for three years previous, making in all a comparison for five years.

Of course, after arriving at the cost of production there is liable to be considerable variation due to the amount of improvements and new construction going on at the various periods of time.

All supplies used are shown under their proper classifications (as per form 6), showing the cost per ton on each.

The next step is the cost of concentrating ore. These accounts (see form 7) are handled in the same manner as the mine cost accounts, except that there is a by-product made during the process of concentrating which is a credit to the operating of the plant.

All ore shipped from the mines to mills is charged to the mill, and the mill is credited only with the number of tons of finished product. This gives the exact cost of each ton of concentrated ore f.o.b. cars at mills.

In all cases the maintenance and repair charges to the different mines and mills are charged off to the cost accounts dur-

*Chief accountant, Witherbee, Sherman & Company, Mineville, N. Y.

ing the month in which they occur, so that when the manager looks for any one operation he finds it all together.

The repair charges are kept so that if it is necessary at any time they may be referred to.

After a mine property is opened and commences producing, any future development of the property is charged direct to the cost accounts of development in ore or development in rock, whichever the case may be. In doing diamond-drill work underground to prove the extent of the orebodies it is charged to mine exploration on the cost sheet (see form 5).

Labor statements (see form 8) are made out each month showing the classification of labor employed and rates paid. These also show the results per ton from labor, and the cost per ton for same. They show, moreover, the results from power-drill work and the tons of ore per pound of powder. The items follow: Machine shop, foreman, machinists, helpers; smith shop, foreman, blacksmiths, drill smith, helpers; carpenter shop, foreman, carpenters; teaming, barn boss, teamsters, helpers; engine house, engineers, brakemen, firemen, coal wheeler; diamond drilling, foremen, runners, helpers; superintendent, master mechanic and clerks, timekeepers, warehouse man, car billers; mining engineers and helpers; laboratory, chemist, helpers; surface foremen; general surface labor; saw-mill men; pocket men; loading stock piles; masons and helper; watchman; electrician. Total. Total surface to date. Less charges outside parties; add charges from other mines. Net total surface; net total surface to date; mining captain and bosses; skip tenders; pumpmen; laborers' company account; roofmen; blasters; trammers, contract; on company account; drill runners, contract; on company account; drill helpers.

There is in vogue at this property a plan which is similar to the profit-sharing idea; that is to say, all men who work full time every day, from one pay day to another, are entitled to a premium of $1 at each pay day (see form 9). In other words, if a man works continuously during the year he adds $26 to his earning power. It works out well at this place and has a tendency to keep the men more steady, as they all realize that if they take one day off they not only lose their day's wages, but an extra dollar besides.

The matter of running the warehouse is one of great importance. For all material needed there is a requisition made, which is sent to the purchasing department, which in turn makes out orders in triplicate for the material wanted, the original order going to the party from whom material is ordered, while the duplicate is placed on file in the general office and the triplicate is sent to the warehouse for its files. In due course of time the invoices and material arrive and are checked off as to receipt of goods by the warehouse clerk; the original bill is sent back to the general office, where the order is checked as to price.

It is essential to know that the warehouse account is correct, so that at the end of the year there will not be any great deficiency or gain in this account, thereby destroying the cost account records for the year. To avoid this it is well to figure a small margin of profit on all goods, with the possible exception of fuel. In order to keep the supply account so that it does not show any great profit or loss it is a good idea to have the various supply classifications checked up every two or three months during the year, so that at the end of the year the supply accounts will balance out very close to the inventory.

It is essential that the person in charge of operations keep in touch with what is being done from day to day, and for his information a daily report (see form 10) is made up. This is obtained by getting

FORM 4. 1000-1-04. B-Y CO. SHEET NO. _____ WITHERBEE, SHERMAN & CO., MINEVILLE, N. Y. INCORPORATED. ACCOUNT NO. _____

NAME

DATE	MEMO	L. FOLIO	S. FOLIO	LABOR	SUPPLIES	TOTAL	DATE	MEMO.	FOLIO	TOTAL

FORM 4.

FORM 11 100 5 06 T. S.

WITHERBEE, SHERMAN & CO., Inc.

COST OF PRODUCTION FOR THE MONTH OF _____ 190____

____MINE	MONTH OF... 190 ... TONS						LAST MO TONS	____ MONTHS, 190____ ____ TONS		____MONTHS, 190____ ____TONS	
	LABOR		SUPPLIES		TOTAL			TOTAL		TOTAL	
	AMOUNT	COST PER TON	AMOUNT	COST PER TON	AMOUNT	COST PER TON	COST PER TON	AMOUNT	COST PER TON	AMOUNT	COST PER TON
MINING EXPENSE											
Stoping											
Development in Ore											
Picking and Storing Rock											

SUMMARY OF PRODUCTION

	PRODUCTION FOR MONTH OF ... 190								PRODUCTION FOR ... MONTHS, 190							
	DIRECT		SEPARATORS		STOCK PILE		TOTAL PRODUCTION		DIRECT		SEPARATORS		STOCK PILE		TOTAL PRODUCTION	
NAME OF ORE	TONS	CWT.	TONS	CWT.	TONS	CWT.	TONS	CWT.	TONS	CWT.	TONS	CWT.	TONS	CWT.	TONS	CWT
TOTAL																

REMARKS:

COMPARATIVE COST				
YEAR	NO. OF MONTHS	TONS	COST PER TON	
190....				
190....				
190....				

FORM 5.

the actual number of skips of ore hoisted from the mines, which are figured on an average basis. This gives the result for each day's work, and as the report is cumulative it ought not to vary much from the cost sheet figures obtained at the end of the month.

All preliminary operations, such as sinking new shafts and construction of new plants, is carried under the head of new construction, but when the production of ore commences, the cost of such new work is charged off on the cost sheet over a period of time until it has been wiped out.

As the known fields of iron ore in this locality have been pretty well tested and as the crude material in the ground has steadily advanced in value, it is advisable to know that a fair price is being obtained for the product. In order to take care of this problem it seems necessary to make a charge to depletion of ore reserves, so that when the present supply has been exhausted there will be a reserve fund to apply on the purchase of a new supply, or to know that the ore supply has not been depleted.

The following outline shows the mehod:

WITHERBEE, SHERMAN & CO., Inc.

COST OF PRODUCING MAGNETICALLY SEPARATED IRON ORE FOR THE MONTH OF ..... 190....

MILL No.....	MONTH OF... ... .190 ..... TONS						LAST MO.	..... MONTHS, 190.... ..... TONS		..... MONTHS, 190.... ..... TONS	
	LABOR		SUPPLIES		TOTAL		TONS	TOTAL		TOTAL	
	AMOUNT	COST PER TON	AMOUNT	COST PER TON	AMOUNT	COST PER TON	COST PER TON	AMOUNT	COST PER TON	AMOUNT	COST PER TON
CONCENTRATING EXPENSE											
Crushing Ore											
Dryers											

SUMMARY

NAME OF ORE	TONS OF CRUDE ORE TO SEPARATOR		TONS OF CONCENTRATES	TONS OF CRUDE ORE PER TON OF CONCENTRATES	COMPARATIVE COST			
	Mo. of.....	.....Months			FOR YEAR	NO. MONTHS	NO. OF TONS	COST PER TON
			Current Month	Cur. Month	190 ...			
			Last Month	Last Month	190 ...			
			.....Months	.....Months	190....			
				Previous Year .....Months				
TOTAL								

REMARKS:

FORM 7.

SUMMARY OF SUPPLIES USED

CLASSIFICATION OF SUPPLIES	COST OF SUPPLIES FOR MONTH	COST OF SUPPLIES FOR YEAR	MONTH .....TONS COST PER TON	.....MONTHS .....TONS COST PER TON
101 Explosives				
102 Oils				
103 Packing and Waste				
104 Fuel				
105 Iron and Steel				
106 Drill Steel				
107 Bolts, Nuts and Washers				
108 Power Drill Parts				
109 Gas Pipe and Fittings				
110 Lumber and Building Material				
111 Tools				
112 Electrical Supplies				
113 Steam and Air Hose				
114 Forage				
115 Wood				
116 Belting and Wire Rope				
117 Carbon				
118 Miscellaneous				
Shop Supplies				
TOTAL SUPPLIES				
Sundries				
TOTAL				

FORM 6.

FORM 1—25 M—12-05

TIME STATEMENT.

Check No.

In Account with **Witherbee, Sherman & Co.** [INCORPORATED]

MINEVILLE, N. Y. For

CREDITS		
By.....Days at $.....		
" ..... " "		
" ..... " "		
" ..... " "		
" ..... " "		
" Premium		1 00
Total		
DEBITS		
For Rent.....		
" Wood.....		
" Supplies		
.....		
.....		
.....		
.....		
Balance as per Pay Roll		

THIS STATEMENT IS NOT NEGOTIABLE.

Received Payment.

[SIGN HERE]

FORM 9.

Mines. { General Labor, Drill Runners, Trammers, Shops, Supplies } Cost Sheet

Mills. { General Labor, Shops, Supplies, Switching } Cost Sheet

} Total Cost.

Liability insurance is provided for, in case of injury to men, payments being made upon presentation of a properly filled certificate; the men do not pay anything for this. Single men are paid $3 a week and married men $5 a week for 26 weeks, or less, as the length of disability may vary. The first five days are deducted as a means of preventing shamming. These reports are taken to a doctor, upon whose authorization the payment is made. This applies to men hurt in the discharge of their duty. The company also pays for doctor's charges and medicine.

WITHERBEE, SHERMAN & CO. INCORPORATED.

DAILY REPORT OF OPERATIONS 190

	OLD BED MINES												HARMONY MINES											
	JOKER SHAFT					BONANZA SHAFT					OLD BED		A SHAFT					B SHAFT				HARMONY	
	Day	Night	Total	Total Tons, etc.	MONTH	Day	Night	Total	Total Tons, etc.	MONTH	DAY	MONTH	Day	Night	Total	Total Tons, etc.	MONTH	Day	Night	Total	Total Tons, etc.	MONTH	DAY	MONTH
Shift Boss																								
Ore Hoisted																								
Rock																								
Tools, etc.																								
Total																								
Men Working U. Ground																								
" " Surface																								
" Total Men																								
Tons Per Man Per Day U. Ground																								
" " " " " Surface																								
Total Tons Per Man Per Day																								
No. Men Tramming																								
Tons Per Man Per Day Tramming																								
Hours Delay																								

	SMITH MINE											SEPARATOR NO 1				SEPARATOR NO. 2				TOTAL	
	Day	Night	Total	Total Tons	MONTH	Day	Night	Total	Total Tons	MONTH		Day	Night	Total	MONTH	Day	Night	Total	MONTH	DAY	MONTH
Shift Boss											No. Men Employed										
Ore Hoisted											Crude Ore Received										
Rock											Concentrates Shipped										
Tools, etc.											Tons Conc. Per Man Per Day										
Total											Tons Tailings Shipped										
Men Working U. Ground											Tons Arenite Shipped										
" " Surface											Hours Delay										
Total Men																					
Tons Per Man Per Day U. Ground											REMARKS										
" " " " Surface																					
Total Tons Per Man Per Day																					
No. Men Tramming																					
Tons Per Man Per Day Tramming																					
Hours Delay																					

FORM 10.

LABOR STATEMENT FOR MONTH OF ..... 190....

..... MINE

PRODUCT

PREVIOUS MO. .....

CURRENT MO. .....

TOTAL TO DATE

..... TONS

	NO. MEN	DAYS	AMOUNT	RATE CUR. MO.	RATE LAST MO.
Machine Shop, Foreman					
" " Machinists					
TOTAL UNDERGROUND					
TOTAL UNDERGROUND TO DATE					
TOTAL SURFACE AND U'GD					
TOTAL SUR. AND U'GD TO DATE					
TOTAL SAME MO. LAST YEAR					

SUMMARY	TONS PER MAN PER DAY			COST PER TON			RESULTS FROM POWDER		
	CUR. MO.	LAST MO.	....Mos.	CUR. MO.	LAST MO.	....Mos.	DATE	POWDER	TONS OF ORE PER L.B. POWDER
Surface							Current Mo.		
Underground							Last Mo.		
TOTAL							.....Mos.		
Tramming									
Stoping									

	RESULTS FROM POWER DRILL WORK					
	Hours Run	Average Hours Run per Day	Feet Drilled	Feet Drilled per Hour	No. of Tons Broken	Tons of Ore Per Foot
Current Mo.						
Last Mo.						
Mos.						

REMARKS:

FORM 8.

The Bullfrog Mining District, Nevada.

BY CLAUDE T. RICE.

This district since its discovery, July 31, 1904, has steadily increased in importance, for the more the veins have been developed the more assured becomes its future. Unlike Goldfield to the north, the Bullfrog district, of which Rhyolite is the principal town and near which are at present the largest mines, has become famous not on account of fabulously rich ore but because of its large veins of a good milling grade of gold ore. However, it also contains a good deal of high-grade ore. As a consequence of the small amount of rich ore which is characteristic of the camp, the mines have been developed by companies, instead of by leasers as at Goldfield.

VIEW OF RHYOLITE FROM THE WEST.

There are three main ore zones near Rhyolite. In the west zone are the Original Bullfrog, the Gold Bar, the Homestake and the Daisy, while on Bonanza mountain are the Tramp Consolidated, the Gibraltar, the Golden Sceptre, the Peerless, the Bonanza Mountain, and the Rush groups of claims, in all of which considerable work has been done. To the east of Rhyolite is the Montgomery mountain-Ladd mountain belt. In this belt are situated the properties of the Bullfrog Mining Company, the Bankers National, the Diamond, the Montgomery-Shoshone, the Four Aces, the Amethyst, and several others.

The country rock around Rhyolite consists of a series of volcanic flows, principally of rhyolite, with some andesite, basalt and dacite. Through these flows cuts a series of basaltic dikes, apparently running in all directions, the relation of which to the orebodies is not known as yet. Sometimes they occur adjacent to the orebodies and in many cases the ore near the dike seems to be richer than farther away. However, the district is too young as yet for any assured statements in regard to these dikes. The veins are strong and persistent and usually wide. Some of the orebodies, such as the Tramp, the Montgomery-Shoshone, the Gold Bar and, to a less degree, the Original Bullfrog and the Rush, are immense veins of good milling ore. All these veins have a northerly strike. The gangue is principally quartz, together with some calcite. Much of it is strongly stained by brown oxide of manganese. The gold is quite free and is a bright yellow, differing greatly from the rusty gold characteristic of Goldfield. Some shoots of ore carry considerable silver, especially at the Original Bullfrog, but these are exceptional. Some sulphides are found in the bottom of the Shoshone, and in all probability pyrite is the original carrier of the gold in many of the veins, although at the Original Bullfrog probably tetrahedrite will also be one of the primary sulphide minerals. In the veins of the camp the ore is as yet practically all oxidized. The veins are strong and in the majority of cases can be traced for long distances along their outcrops. The bulk of the ore in all these veins except the Shoshone talc vein is of a milling grade, going from $8 to $25 per ton, although of course lower grades occur. Scattered through the milling ore are shoots of rich ore going well over $100 per ton, besides which seams of talc rich in gold occur through the quartz. Considerable of the high-grade ore has been sacked and is still piled up on the dumps. Some ore was shipped in the early history of the camp from the Original Bullfrog, the Denver, and the Montgomery, but inasmuch as it early became certain that a railroad would be built into Rhyolite, the properties discontinued their shipments and the others did not ship the ore which they had sacked.

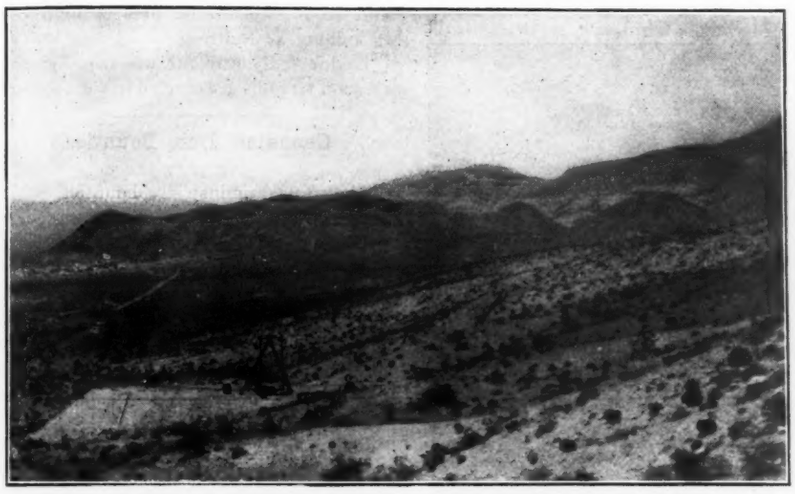
A conspicuous point in connection with the veins in the vicinity of Rhyolite has been that the vast majority of them have been very low-grade at the surface, the value becoming normal at a short distance below the surface. In some mines of the district there seems to be an increase in value with depth, but on account of the great size of most of the veins and the comparatively small amount of development upon them, this is merely a supposition as yet. In some of the mines rich ore has outcropped at the surface, particularly in the Original Bullfrog, where the first strike in the camp was made, and also at the Gold Bar, while at the Montgomery Shoshone some rich shoots of ore came to the surface.

While, at Tonopah, there has been a very pronounced faulting of the veins after their formation and, at Goldfield, there is some displacement of the veins (but to a much less degree), the Bullfrog district, so far as developed, shows a marked absence of any such movement except at the Original Bullfrog, where a series of east and west zones of brecciation crosses through the orebody. Whether there has been any noticeable displacement along these zones development work has not yet shown. Many of the veins have had a reopening along them parallel to the original fissure, which is especially noticeable in the second vein cut in the Peerless tunnel. Large pot holes occur in the veins, which are filled with a good deal of manganese oxide. In many of the veins the quartz is porous and sugary in appearance.

BONANZA MT. FROM EAST, SHOWING RHYOLITE.

The country rock is mainly rhyolite, through which the veins generally strike north and south, with a high dip. There is

also a series of northeast and southwest veins, which have a dip of about 60 deg. to the west. The walls of the veins seem to be good, which will aid materially in mining these large deposits. The veins appear to be mainly formed along a strong line of fracturing, with almost pure quartz at the center, and toward the edges a gradual transition, in many cases, into rhyolite country rock. In all the veins the ore is tested by panning, which is checked from time to time by assays.



AMETHYST SHAFT, NEAR MONTGOMERY-SHOSHONE.

As the country rock is rather hard, development is at present somewhat costly, both on account of the high cost of supplies and the absence of air drills, there being no air drills in use in the camp as yet, except two little Jap air hammers used at the National Bank mine. At present drifting costs from $10 to $16 per ft. for 6x7-ft. drifts. Shaft sinking is expensive on account of the high cost of timber at present. Most of the shafts require timbering all the way down. When timbering is required it is mainly to stop any scaling off which may occur, and not because the ground is heavy. The drifts require no timbering except where some fissure has cut through the country rock.

The treatment of the oxidized ores will be simple, as by far the bulk of the value will be extracted by simple amalgamation, although probably cyanidation of the tails will be necessary. By such treatment upon Montgomery-Shoshone ore, in the laboratory, an extraction of over 90 per cent. of the value has been easily obtained. The district has probably an abundant supply of water for all the mills which will be erected, but this water (which comes from artesian wells in the Amargosa valley) will, in most cases, have to be pumped to the mills, which will be erected at the mines near Rhyolite. In some instances the mining companies have already bought up many of the farms along the Amargosa river which possess water; notably among these are the Montgomery-Shoshone and the Tramp Consolidated companies. Both these companies will erect mills as soon as the railroad reaches Rhyolite. It is the general opinion of competent mining men in the camp that $7 to $10 ore can be treated at a good profit, and probably, after things have got to running well, $5 ore can be treated.

The camp is one of high relief, the summit of Bonanza mountain being 1000 ft. above the town of Rhyolite, which is about 3700 ft. above sea level. Consequently, the veins occurring high up on Bonanza mountain, Montgomery mountain and Ladd mountain are well adapted to tunnel development; but in many of the veins shaft development will be necessary. The Tramp Consolidated properties, the Montgomery-Shoshone's main quartz vein, the Rush vein and some of the Gibraltar veins are well adapted to tunnel mining.

In shaft developments all hoisting has so far been done by bucket except at the Gold Bar mine, where self-dumping skips are used. Fairbanks-Morse gasolene hoists are the favorite here, as well as in the other desert camps in the New Nevada. There is some talk of transmitting water power generated in California to Bullfrog, but at present this is only talk.

Besides the Tramp Consolidated company, which is the largest property on Bonanza mountain, and the Gibraltar, which is a somewhat less important property, the Golden Sceptre, the Peerless-Bulfrog and the Bonanza Mountain mining companies are working extensions of either the Tramp Consolidated or the Gibraltar system of veins.

In the property of the Peerless-Bullfrog seven different veins have been located, most of which run north and south. Most of them have been opened up only by surface working, some of them outcropping. The underground development consists of a drift, 250 ft. long, driven into the side of Bonanza mountain. This has cut two veins, the first at 160 ft. from the portal, the second about 240 ft. from the portal. The first vein is about 6 ft. wide and contains good milling ore; a short drift has been driven about 40 ft. west along this vein. The second vein is 5 to 6 ft. wide and is milling ore. Both these veins contain quartz with some calcite and a strong manganese oxide stain. This tunnel will probably cut three more veins when it is extended, and it will give a back of from 200 to 250 ft. on them. The only other underground work consists of a 4x8-ft. shaft, 65 ft. deep at present. This is sunk at the intersection of two veins.

The Bullfrog-Golden Sceptre Mining Company is working a series of veins, these being the extensions of the four Gibraltar and the Hobo veins. The upper tunnel is in 380 ft. and cuts a vein 14 ft. wide which goes from $5 to $15 a ton, but little drifting has yet been done on this vein. The lower tunnel is being driven by three shifts. A shaft 80 ft. deep is being sunk to develop some of the other veins. The

HOMESTAKE MINE.

Bonanza Mountain Mining Company is developing its veins by shafts.

On Montgomery mountain, near the Montgomery-Shoshone, are several other companies. The Amethyst shaft is down 120 ft. and crosscuts are being driven to intersect two veins outcropping on the surface. At the Providence, the shaft is down 100 ft., and they are drifting on a vein. Further east are the Lucky Jack, Red Oak and Pittsburg, all of which are doing development work. On the Pittsburg there are two shafts; the East Sapper shaft is down 200 ft., and has cut a vein of ribboned jasper and chalcedony. About 300 ft. west is the West Sapper shaft, which is 100 ft. deep and has cut a vein of talc and quartz.

END OF RAILROAD FROM GOLDFIELD TO RHYOLITE.

The Montgomery Mountain Mining Company is working claims on Montgomery mountain by means of adits. One crosscut adit is 250 ft. long. The vein is 12 ft. wide and pans well. It runs northeast and southwest and dips 70 to 80 deg. to the northwest.

On Ladd mountain several properties are working. The Diamond Bullfrog Mining Company has opened up a vein of milling ore containing some shipping ore by means of an inclined shaft. The Bullfrog Mining Company is also working some veins on Ladd mountain. These are northerly and southerly veins dipping about 60 deg. to the west. There are three ledges from 2 to 8 ft. wide, with ore assaying better than $10 to $12 a ton. These veins have a quartz gangue stained with manganese; some of the quartz is quite sugary in appearance. There is also a zone of brecciated ledge matter, 15 to 20 ft. wide, which carries low value in gold. The workings consist of a tunnel 600 ft. long and a shaft 150 ft. deep with drifts on the veins at the 50- and the 100-ft. levels.

The Bullfrog National Bank and the Yankee Girl Mining Company are also working on Ladd mountain. The National Bank shaft is 220 ft. deep and is being sunk farther. The drift on the 100-ft. level is 600 ft. long on the vein. On the 200-ft. level the drift on the vein is 1000 ft. long. The orebody consists of milling ore with some high-grade ore.

To the west of town is the Original Bullfrog-Gold Bar zone. The Homestake company is working the northern extension of the Gold Bar deposit. It has an inclined shaft 320 ft. deep; at the 200-ft. level a drift in the vein 125 ft. long has been driven to the south; on the 320-ft. a drift has been driven both north and south from the shaft.

The wages paid in the Bullfrog district at present are as follows: Blacksmiths, $5.50; miners and muckers, $4.50; surface men, $4.50; miners in raise or shafts after 10 ft. deep or high, $5; hoisting engineers, $5.50; carpenters, $8.

The cost of supplies at present is as follows: Powder (Hercules), 40 per cent., 18c. per lb.; fuse (6000 ft. in case), $35 a case; candles (Schneider's), box 405, $7.75; drill steel per lb., 15c., blacksmith coal in ton or one-half ton lots, 4½c. per lb.; picks, Verona make, $18 to $21 per dozen, Washoe make, $12 to $15 a dozen.

The freight rate from Goldfield to Bullfrog is 2c. a lb.; from Johnnie siding on the Tonopah & Las Vegas railroad, $1.75 per hundred.

In all probability the cost of supplies will be greatly reduced as soon as the railroad reaches Rhyolite.

The absence of air drills to be used in hard rock and the high cost of supplies and labor explain the present high cost of mining at Bullfrog.

Undoubtedly Rhyolite will boom greatly as soon as mills are erected to treat the ore.

LUCKY TOM SHAFT, NEAR MONTGOMERY-SHOSHONE.

Canadian Iron Bounties.

The total industrial bounties, during the fiscal year 1905-06, amounted to $3,088,407, an increase of $229,056 over 1904-05. The payments on iron and steel indicate a great increase in the output, though the rate of bounty has been reduced; next year the bounties will be discontinued altogether unless renewed by Parliament. The total bounties on iron and steel were $2,004,339 as compared with $1,540,203 for the previous year. On pig iron the amount paid was $687,632, the product being 581,858 tons, of which 86,523 tons was from Canadian ore. The previous year's output was 386,719 tons, of which 59,452 was from Canadian ore. On steel ingots the bounty was $941,000, and the output 569,237 tons as against 272,916 tons in 1904-05. On articles manufactured from steel, rolled angles, wire rods, etc., the bounty was $369,832 on 72,875 tons, the output for the previous year being 59,842 tons. The heaviest sums for bounties were paid to the Dominion Iron and Steel Company of Sydney, N. S., which drew a total of $957,337. The Algoma Steel Company came next with $535,190. The Hamilton Steel and Iron Company drew $200,905, and to the Nova Scotia Steel Company $187,693 was granted.

Electrical Mining Hoists.

BY J. W. H. HAMILTON.*

The tendency to reduce operating costs of power machinery, which during the last few years has been very pronounced, has brought about great improvements in the construction of electric hoists. While this country has been leading in the development of small hoisting machinery, especially for elevator service, Europe has taken the lead so far as the large sizes of electrical mining hoists are concerned. The latest development in this line is the hoisting system devised by Carl Ilgner, chief engineer of the Austrian firm of Siemens-Schukert-Werke. Several mining hoists of this system have now been in operation long enough to prove their superiority, under certain conditions, to any other hoist.

Several articles about these hoists and discussions of them have appeared in the European technical press, but very little about them has been published in this country. An article on this topic may therefore be timely. A short discussion of the general types of mining hoists will be necessary in order to give a better appreciation of the advantages of the new one.

For deep mining purposes, where a large amount of power is required for hoisting, steam was for a long time practically the only available power. The steam hoist is still the prevailing type, and will remain so for a number of years. The engines for these hoists have to work under very unfavorable conditions. The starting torque must be very great, especially if the rope is unbalanced. The running torque during the period when the load is being accelerated is, for a high-speed hoist, considerable. At the beginning of the run, a large hoisting engine may have to deliver from 1500 to 2000 h.p., but when the point of maximum speed has been passed, the power required is only a small fraction of that amount. The engine must be designed for the maximum load, and, consequently, it works at its highest efficiency during only a short part of the run. It is obvious that the mean efficiency with which it works is low, and a steam hoist is therefore wasteful of power. In many mines, however, especially in collieries, where coal is cheap, the expense for power may be of minor importance. In these places steam hoists would probably hold their own if they were not undesirable for other reasons. The engineer must give the engine the closest attention and must manipulate a great many levers during the run of the hoist. If an accident should happen, he is likely to loose his head and work the wrong lever unless he is a man of good training and skill. The successful running of the hoist is therefore very much dependant on the skill and attention of the engineer. It must be admitted, however, that steam hoists, in spite of all their complicated levers, connecting rods, and valves, do excellent service and prove to be far more reliable than the early electric hoists.

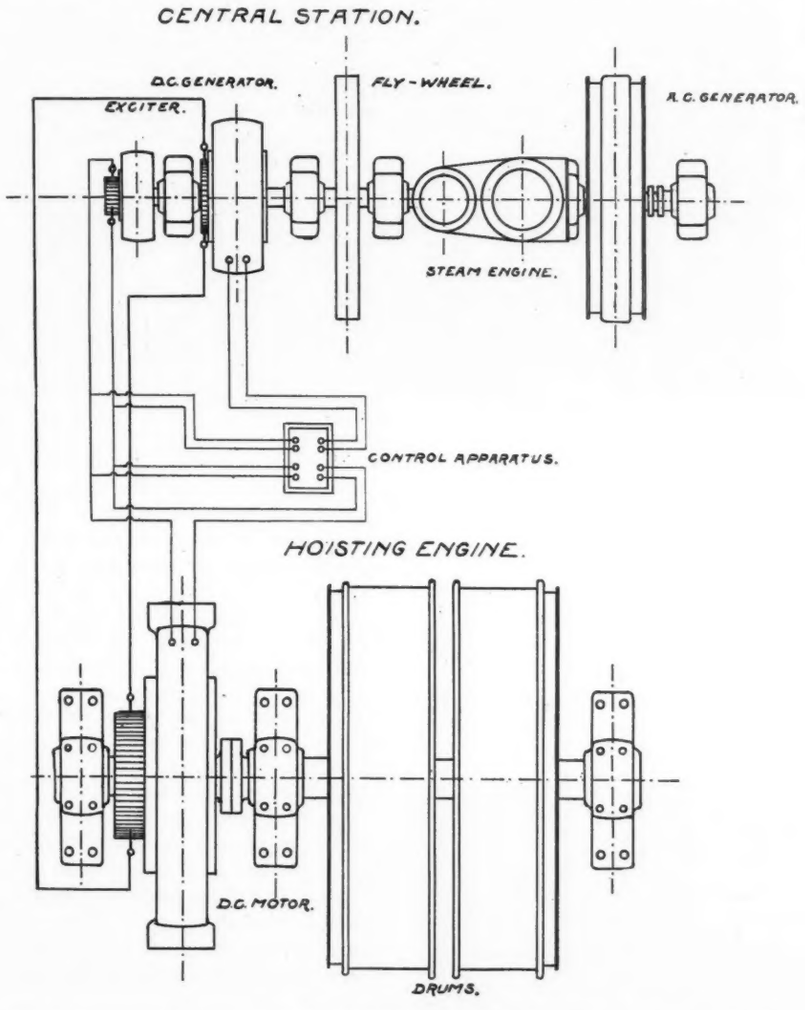


FIG. I. HOISTING ENGINE WITH CONTROL-DYNAMO DIRECT COUPLED TO STEAM ENGINE.

When electric machinery was first used in mining work, the material used for insulation was not of a quality which could withstand the damp atmosphere and the rough usage to which mining machinery in general is subjected. Break-downs on account of defective insulation were frequent, and electrical machinery soon fell into disfavor with mining engineers. Its progress in the mining field has therefore been comparatively slow. Difficulties on account of poor insulation have been overcome in the last few years. There are examples of induction motors which for weeks have been submerged in flooded mines and, after having been thoroughly dried, have been used without any repairing. On account of the improvement in insulation, and for other reasons, electrical mining machinery is returning to favor.

For small hoists, the series railway motor, on account of its good starting torque and the almost automatic adjustment of its speed to the load, has shown itself very well adapted. For large hoists, the shunt motor, the speed of which is almost independent of load, is most suitable. If a strong starting torque is required for the large motor, the compound motor will answer the purpose. After the introduction of alternating current machinery and long distance transmission lines, the three-phase induction motor soon secured a place in the mining industry. Because this machine is very simple, and can be relied upon to work well under varying conditions without any attendance, it is admirably fitted for work in a mine. In many mines, three-phase is the only available current, and the induction motor is therefore used for the hoisting machinery. All hoists using this motor, and most of those using the direct current motor, are of the geared type. For direct current motors of over 100 h.p. capacity, however, it is advisable to have the motor direct-connected to the hoist, thus doing away with the

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gear, which always causes more or less loss of power and unnecessarily complicates the machinery.

A direct-connected motor costs a great deal more than a geared motor, which, on account of its higher speed, can be made much smaller. The starting of a direct-current motor is accomplished by means of series resistances, which re-reduce the voltage of the armature. In starting an induction motor, the resistances are connected in series with the rotary circuits. For a very large hoist, the energy consumed by these resistances is considerable, especially at the beginning of the run. In spite of the loss on this account, the electric hoist has undoubtedly higher efficiency than the steam hoist, but it sometimes has a serious drawback. If a large hoist takes its power from an electrical system of distribution which supplies power to other machines, and perhaps also furnishes the light, the fluctuations in the voltage of the system caused by the operation of the hoist are often so great that they will seriously interfere with the operation of the other machines. This is particularly the case when alternating current is used. The starting of a large induction motor under a heavy load has a bad effect on the power factor of the system, and if synchronous motors are run from the same circuit, they are likely to fall out of step, which usually causes the stopping of every machine in the system. After accidents of this kind, it was natural that mining operators should condemn electric hoists, and there are cases where they have substituted steam hoists for large, expensive, electric ones, after the latter had been in operation for a short time.

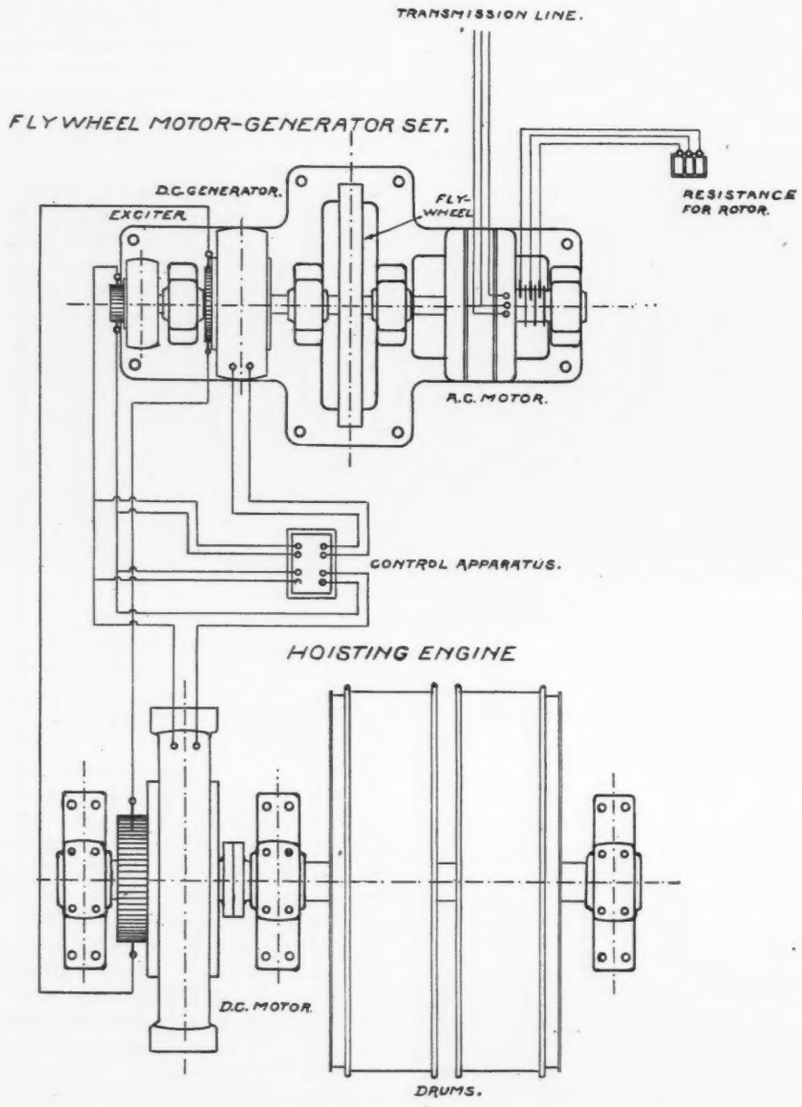


FIG. 2. GENERAL ARRANGEMENT OF HOISTING ENGINE WITH FLY-WHEEL CONVERTER.

If the station is near the mines, a separate transmission line can be run for the hoist in order to avoid its bad effect on the running of the other machines. A good arrangement in this case is to have a special direct-current generator mounted on the steam engine shaft. The main generator, made for direct or alternating current as the case may be, is mounted on the same shaft. An arrangement of this kind is shown in Fig. 1. The heavy flywheel helps to take up the fluctuations in the load. The field of the hoist motor is separately excited, and the armature current is controlled by changing the field current of the generator. This system of control is very good, as it requires no starting resistance and no circuit breakers and switches in the main circuit.

If the direct-current generator is to supply current to several machines at the same time, this system cannot be used. A storage battery is then of advantage to take up the fluctuations in the load and to act as reserve in case of a break-down in the generating plant. The starting and operation of the hoist motor is usually accomplished by means of resistances in series with the motor armature. The bad effect which this method of control has on contact surfaces, as the handling of heavy currents by means of switches and circuit breakers cannot be avoided, makes it less desirable for large units. It is therefore better to control the voltage by means of a motor generator set, the motor of which takes its current from the main busbars of the power station. The generator armature of the set is connected in series with the armature of the hoist motor, and its voltage at full speed is equal to that of the busbars. By changing the field of the generator a complete control of the voltage of the motor terminals can be effected. The hoist motor

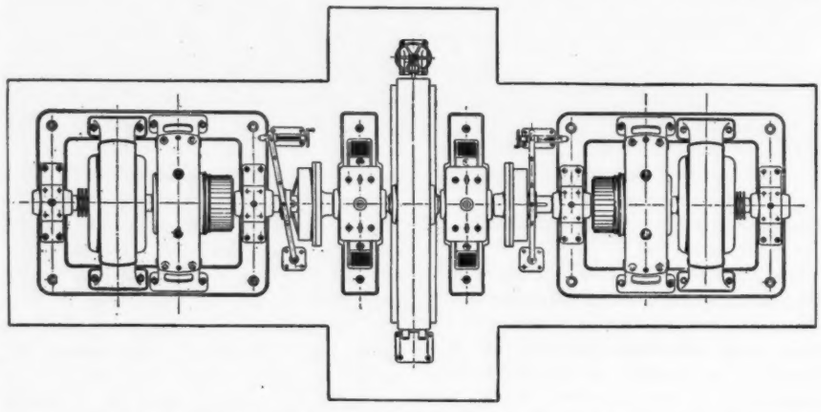


FIG. 5. ARRANGEMENT OF A DOUBLE FLY-WHEEL CONVERTER WITH DISENGAGING COUPLINGS.

has its field current supplied directly from the busbars. When the voltage of the motor generator is bucking the busbar voltage, the armature current for the motor can be reduced to zero. If the field current is decreased, the voltage at the motor terminals rises, and the motors start very smoothly. When the field current has been reduced to zero, the hoist motor has the same voltage as the busbars. The field of the generator may now be reversed and the voltage be boosted to twice the busbar voltage. If the latter is, for instance, 500 volts, the motor voltage will be 1000 volts; or, in case two motors are connected in series, each will be of 500 volts. A storage battery is not necessary in connection with this system of control, but it is always of advantage. When used, it is connected in parallel to the busbars of the station.

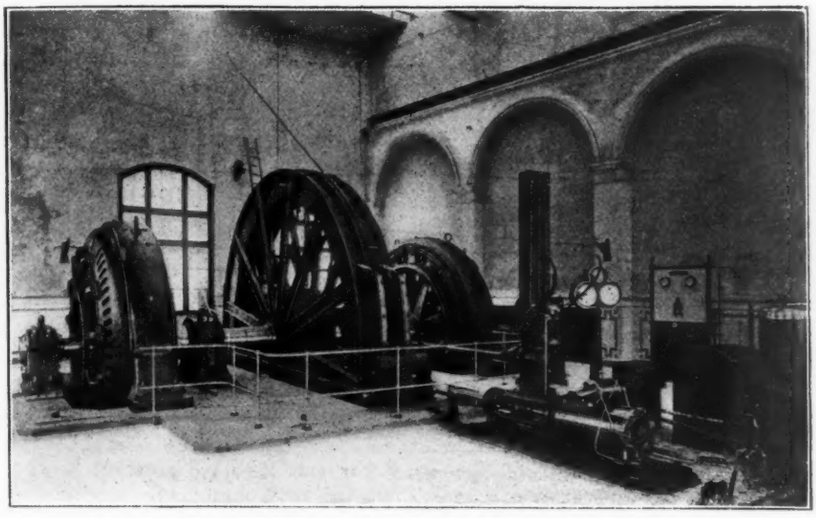


FIG. 3. HOISTING ENGINE—MATHIAS STINNES COLLIERY AT CARNAP, NEAR ESSEN, GERMANY.

When the power system is located far from the mines, a storage battery cannot be used in the station itself. The cost of transmitting direct current over long distances is prohibitive. A three-phase transmission line is generally used, and the electrical machines are therefore mostly made for alternating current. In case a large mining hoist is to take its power from the same line as the rest of the machinery, it is advisable to install a motor generator set which transforms the alternating current to direct current, as the direct-current motors are much to be preferred to those of alternating current for hoisting purposes. A storage battery can be installed in a sub-station and connected in parallel to the generator of the motor-generator set. The fluctuations in the load are so well taken up by the battery that a separate transmission line is not necessary for the lighting circuits. In a system of this kind the operation of the hoist does not affect the power factor of the line. As the motor generator stores energy in the battery during intervals between hoisting, the load on the alternating-current motor is maintained almost constant. During the period of acceleration the hoist requires a great deal of power and the energy is taken from both the battery and the motor-generator set. The latter therefore maintains its normal load and its capacity need not be more than half that of the hoist motor.

A large hoist with this arrangement has been built at the Grängesberg iron mines in Sweden, and it has been working to the entire satisfaction of the engineers during the two years it has been in operation. The converter of this hoist has a synchronous motor, by means of which it is possible to keep a good power factor on the transmission line and thus to some extent eliminate the bad effect of the inductive load which is caused by a great number of induction motors. The control system for the Grängesberg hoist was worked out admirably. All the operations of starting, running, stopping, braking, and reversing the two direct-current motors are controlled by one lever. The motors are direct-connected and each has a normal capacity of 450 h.p. Mistakes in the operation of the hoist are almost impossible, as the different operations fall into proper sequence when the control lever is moved. When stopping, for instance, it is impossible to apply the brakes until the current has been cut off, and when starting the motors, the circuit can not be closed until the brakes are off. Though the storage battery does greatly improve the conditions for a large hoisting engine, it has not gained a very large application for that purpose. This is largely due to its expensiveness. Not only is the first cost of the storage battery high, but also the expense for its maintenance is considerable. It requires large floor space and is best kept in a separate building, so that the vapors from it are kept out of the power station, where they are very harmful to all exposed iron and metal parts and insulating material.

It was for this and other reasons that Carl Ilgner conceived the idea of substituting a heavy high-speed fly-wheel for the storage battery. At first glance, it may seem impossible that the fly-wheel should be able to store a sufficient amount of kinetic energy to balance the load on a power system from which one or several large mining hoists take their current. However, a few calculations will show that it is theoretically possible, and experience has proved that the practical difficulties of the problem can be overcome. The great improvements, which during the last few years have been made in the design of bearings and in the casting of large steel pieces, have made it possible to run heavy fly-wheels at a very high speed. The fly-wheel is mounted on a motor-generator set, which therefore may be termed a fly-wheel converter. This converter runs at a speed which varies just as much as is necessary to make the fly-wheel absorb and discharge the kinetic energy required to balance the fluctuations in the load.

Fig. 2 shows the general arrangement of the Siemens-Ilgner system. The hoist motors are always direct-current. Their field currents are supplied from a small exciter mounted on the converter shaft. The converter can be connected to any system of current distribution which may be desired. No changes in the power station will be necessary on account of its supplying current to the hoisting plant. The power consumption of the plant will be almost uniform, and the running of the

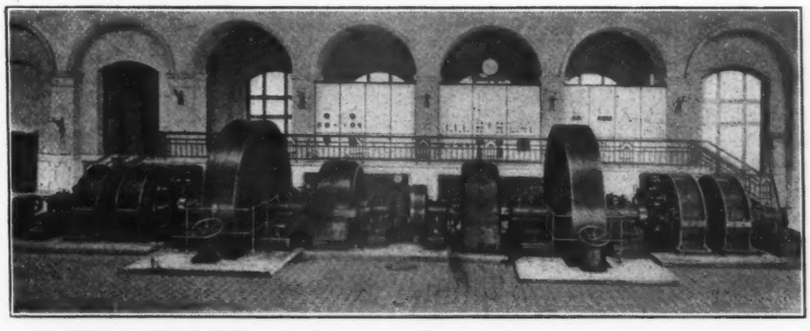


FIG. 4. DOUBLE FLY-WHEEL CONVERTER.

hoist will therefore not cause any disturbance in other circuits for power and light which take their current from the same system. The hoisting plant can be placed at a great distance from the power station if a three-phase transmission line is employed. On account of the uniform absorption of energy by the plant, the cross-section of the wires in the transmission line will be minimized and the loss of power on the line will be reduced. As the motor of the converter set will maintain an almost uniform load, the power which it transmits in the intervals between the runs of the hoist being taken up as kinetic energy by the fly-wheel, the efficiency of the motor will always be at its maximum if the motor be properly dimensioned. One of the essential features of the system is the use of the Ward-Leonard control. For machines which have to be started and stopped frequently under heavy load, this system of control is very effective. The hoist motors are controlled by varying the exciting current, which is only from 2 to 3 per cent. of the main current, and therefore there is no dissipation of energy in resistances. No switches and circuit breakers are necessary in the main circuit of the hoist motors, as this circuit never needs to be broken. As this arrangement saves all trouble from the burning of contacts, which usually accompanies the handling of heavy currents by means of switch apparatus, its advantage is obvious. Unless the whole plant is to be closed for some time, the high potential circuit needs not be broken. The control apparatus is operated by means of a lever, and it is designed in such a way that to each position of the lever responds only one speed of the hoist, no matter whether the load is being raised or lowered. This is of great advantage, as the operator always knows where to place the lever in order to get the speed he wants. In many systems of control the speed of the hoist is much dependant upon the size of the load and whether it is being raised or lowered. The operator must then by trials find the position of the lever which will give him the desired speed. The control lever is inter-connected with the depth indicator and the safety apparatus, which checks the speed of the hoist. A too rapid acceleration or retardation of the hoist is made impossible. If the cage overruns the bank, the control lever is automatically forced into the off position and the brakes are instantly applied. A mistake on the part of the engineer is therefore almost impossible. The brakes are operated by means of compressed air. In addition to the working brakes there is a safety brake which comes into operation in case the air pressure is insufficient to operate the working brakes or in case the cage overruns the bank. If the power from the station suddenly gives out while the hoist is running, the kinetic energy of the fly-wheel is sufficient to complete the run.

A New Rotary Gas Meter.

The Rotary Meter Company, of New York, is manufacturing and introducing a meter for the measurement of artificial and natural gases, which posesses many interesting points. These meters are furnished in size from a small private-house affair, with a capacity of from 150 to 1500 cu.ft. per hour, to large station meters measuring from 10,000 to 100,000 cu.ft. per hour. The principle of the anemometer has been utilized, and improvements have been made whereby reference to a curve of correction has been rendered unnecessary because the meter correctly records the amount of gas passing.

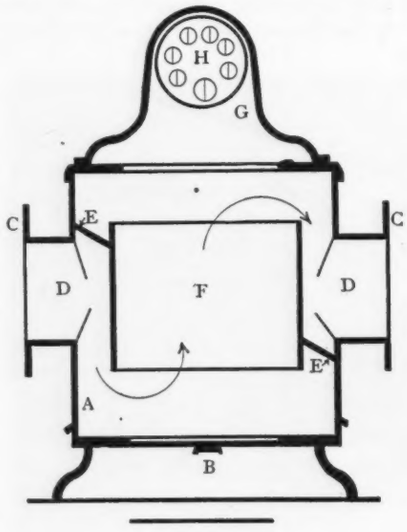


FIG. 1.

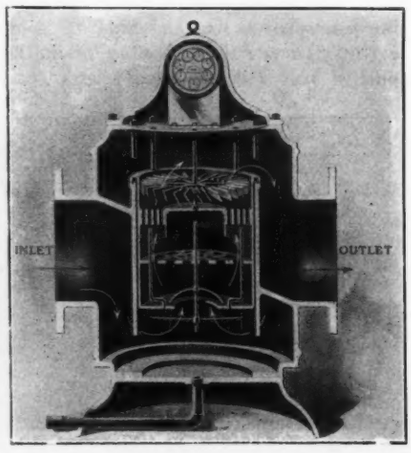


FIG. 3.

The construction of the apparatus is as follows: the meter, Fig. 1, consists of a strong cast-iron body *A* on base *B*, with turned flanges *C C*, to connections *D D*. The inlet and outlet connections are separated by an oblique partition *E* in the body, through which the vertical tube *F* passes centrally. The whole is surmounted by a cast-iron hood *G*, to which is fitted the bezel and index covers.

The working parts, *H*, Fig. 2, consist principally of a turbine wheel a, with vanes set at an angle of about 45 deg. This turbine wheel is carried by a central shaft *b*, jeweled at the top and bottom bearings to reduce friction, and thus to secure perfect freedom of action as well as to prevent wear. On the shaft is a worm wheel *C* gaging with and actuating the inside mechanism.

Below the turbine wheel are a series of vertical guides *d*, which give direction to the gas passing through them; *e* is a light valve which effectually prevents any backward flow taking place. The principal object of this valve, however, is to cause a small quantity of gas to pass directly and at a slightly increased pressure to the vanes through the chamber or tube *f*, and thus insure the rotating of the turbine wheel at small rates of flow.

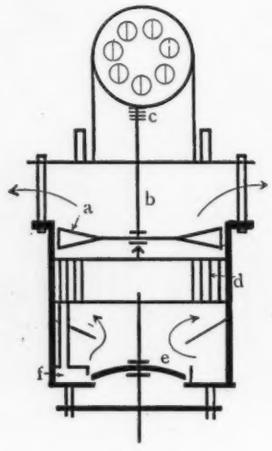


FIG. 2.

Very small quantities of gas cannot be registered in this type of meter, but by adjusting the quantity of gas passed directly on the vanes by the tube *f* the desired degree of accuracy is obtained. It will be seen from the construction of this meter that, unlike the old style type, the working parts can be taken out of the body in a very short time and examined, or replaced by other working parts, all being interchangeable.

Light-proof Lithophone.

Lithopone is generally manufactured by treating sulphide of barium with a solution of sulphate of zinc. The resulting mixture of sulphide of zinc and sulphate of barium is then dried, heated and chilled in water. Against its valuable properties, as its sanitary harmlessness and its stability against the action of sulphureted hydrogen, the ordinary lithopone has the disadvantage of being altered by sunlight. J Ephraim, Königgrätzerstrasse 69, Berlin, in British patent 7819, of 1906, states that lithopone is rendered more stable against light if it has been treated with a salt of non-acid nature, which is capable of precipitating zinc compounds from solutions of zinc salts.

Mining and Milling at Platteville, Wis.

STAFF CORRESPONDENCE.

The Enterprise mine, mill and magnetic-separating plants have been described in a previous article. This article deals with the other mines of the Platteville district.

THE EMPIRE MINE.

The Empire ore, as sent to the mill, averages about 25 per cent. zinc and 8 per cent. lead. It occurs in sheet deposits, which vary from 2 to 6 in. in thickness, and extend over a vertical hight of 50 to 80 ft. The deposit has a general trend slightly north of west. The sheets occur as a top flat and a main pitch dipping about 50 deg. toward the south. From this pitch there is sent off a series of thin sheets which makes back into the foot wall. The ore in the upper flat has been quite free from marcasite, but the presence of that mineral is increasing with depth, and separation is now required to treat the ore. The company has contracted for a Galena roaster and a Cleveland-Knowles separator.

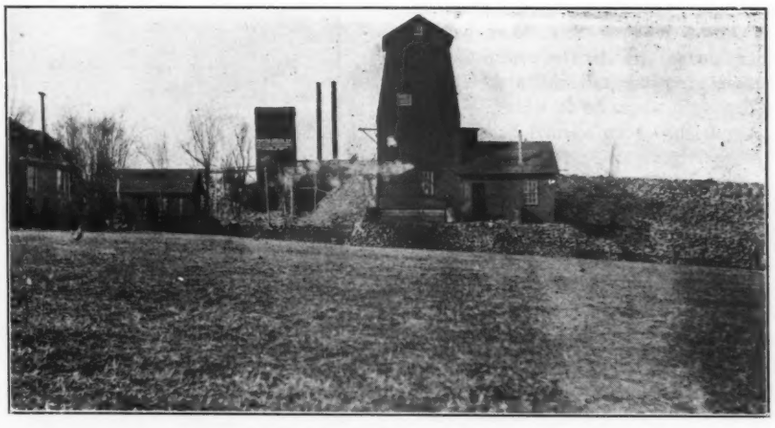
EMPIRE MINE.

The mine is opened up by two 9x5½-ft. shafts. One of these is used for pumping, while the other is used for hoisting. A bucket holding 1000 lb. of ore is used for hoisting. The bucket is dumped into a hopper, which holds three buckets, whence the ore is drawn into a car and taken by gravity down a trestle to the mill, 1000 ft. away.

The ore is mined in a series of slices which extend laterally as far as the ore makes. These slices are generally about 7 or 8 ft. thick. The top slice is taken out by machines mounted on bars, but the lower slices are taken out by machines mounted on tripods. Pillars are left whenever it is thought that the roof requires them. Frequently these pillars are 100 ft. apart; in other places they are only 25 ft. apart. Four 2¾-in. Ingersoll-Sergeant drills are used to break the ore. A 2¾-in. machine drills from six to eight holes, 7 to 8 ft. deep, per shift. About 100 tons of ore are hoisted per day. Twenty-five men work at the mine day shifts, and eight men night shifts. The men on night shift shovel back the broken ore, and sort out waste and pack it away.

THE EMPIRE MILL.

This mill treats the ore by means of several jigs, no tables being used. The water is used over again, being pumped back by two centrifugal pumps. About 100 to 125 tons of mine dirt are treated a day, producing about 25 tons of blende concentrates, and about 1 to 1.5 ton of galena lead. These were formerly of high grade, but owing to the increase of marcasite in the ore the grade has run down. The mill runs one 10-hour shift.



EMPIRE MINE.

It costs about $10 to $12 for the Empire Company to produce its finished concentrates, i.e., including mining, milling, etc.

THE ST. ROSE MINE.

This mine is situated about four miles southwest of Platteville. The ore occurs as two sheets and two layers of disseminated ore at the base of the Galena limestone. The top sheet occurs in "blue rock," and is about 7 in. wide; then there is a zone of disseminated ore, which varies in width from 2 to 5 ft.; below this is a sheet of blende which is not so strong as the top one. This occurs right at the top of the oil-rock. In the oil-rock there is disseminated ore, which varies a good deal in width. The ore at the west end of the deposit is disseminated and is from 2 ft. up to 10 ft. in thickness. This disseminated ore lies right above the oil-rock, and some of the best of it is formed in the oil-rock. The deposit varies in width, but is at least 20 ft. wide at the west end and about 30 ft. wide at the east end.

This is worked through a 9x5-ft. shaft, 45 ft. deep. The output is 30 to 35 tons of ore a day, which averages from 20 to 25 per cent. zinc. The mine works two 8-hour shifts and hoisting is done on each shift, but the mill runs only one 10-hour shift. The present deposit has been worked about three years.

The mine uses two electric drills, one a Gardner, the other an Adams. The Gardner drill has been used three or four years, and seems to work satisfactorily. It will drill from 10 to 12 holes, 5½ ft. deep, per shift. Forty per cent. dynamite is used, and the holes are fired by electricity. The mine is electrically lighted. In the mine there are, besides the boss, four drill men and three shovelers. The drill runners get $2.50, the helper, $2.25, and the shovelers, $1.75 per shift of eight hours.

The mill has a capacity of about 50 tons of ore, going 10 per cent. ZnS. The ore is crushed by a Blake crusher and rolls; and after being sized, is treated on an eight-compartment jig. The jig runs at 200 r.p.m. The size of the jig screens is 30x36 in. They are all perforated sheets. A thick bed is used on the jig, it being 5 in. on the first cell and about 3 in. on the last one. The mill is run by a 40-h.p. gasolene engine.

The mill produces about 165 tons of jack concentrate per month, which runs from 38 to 60 per cent. ZnS, varying according to the amount of iron sulphide in

the ore. Four men work at the mill. Their wages are: mill-man, $3; helper, $1.75; feeder, $1.65; engineer, $55 a month. The cost of producing the concentrate is from $8 to $10 per ton.

THE HIBERNIA MINE.

This mine is situated about one mile north of the railroad station, at Platteville. The ore occurs as flats and pitches over a vertical range of 12 to 15 ft., at the base of the Galena limestone. The bottom of the ore rests on the oil-rock, which is about 2 ft. thick; but in two places two sheets of ore, one 3 in. thick, the other 4 or 5 in., and about 6 in. apart, are being followed down into the underlying Trenton limestone. As they have not been followed more than 10 ft., one cannot tell what will result from them. Apparently, they both get stronger in depth. The ore runs a little north of west, and is on what is called a "four o'clock." The top sheet is the strongest and varies from 8 to 18 in. in thickness. Below this occur several thinner sheets, which are connected together by vertical and inclined feeders. This deposit is about 60 ft. wide.

The mine has been opened by a 9x5-ft. two-compartment shaft, 165 ft. deep. At the bottom of the shaft there is a cross-cut, and a drift along the vein in both directions. These drifts are about 6x7 ft. in the clear, driven by double jack work, using ⅝-in. steel and 40 per cent. powder. Tape fuse is used in blasting. It takes about nine holes to break these drifts. A cut of three holes, about 3½ to 4 ft. deep, pointing down to about 45 deg., is used. Then a row of three breast holes is drilled. The cuts and breast holes are drilled and blasted by noon, and after mucking back, the drift is squared up with three uppers about 2 ft. deep. In this way the drift is driven about 2 ft. a shift. These holes take from 2½ to 4 sticks of small powder to break them, so that one can see that the ground is not very tight. Besides, as the bed lies fairly flat, the miners generally have a good floor and roof to break to. There are about 16 men on the pay-roll. All the hoisting is done on day shift. There are two sets of double jackers, both day shift and night shift; and two shovelers on day shift. All the men work 8-hour shifts. The wages for miners, muckers, and top men are $2, and for engineers, $3.

THE GRANT COUNTY MINE.

This mine, near Platteville, was developed by drilling below old lead ground. A shaft, 155 ft. deep, was then sunk to the base of the Galena formation. Then a cross-cut was run about 150 ft. toward a drill hole, where zinc ore was struck. The zinc ore occurs in thin sheets and pitches over a vertical range of 12 to 15 ft., and over a width of 50 ft., in some places. There is considerable marcasite in the ore, so that a roaster will be required to treat it. The iron sulphide seems to increase toward the bottom of the deposit.

ST. ROSE MINE AND MILL.

Two 2¼-in. Ingersoll-Sergeant drills are used underground, one in each of the headings that are being driven. These are mounted on an arm from a vertical bar, and two men run the drill. It takes 12 holes to break a round out of these drifts, which are about 6x7 ft. in the clear. The holes are arranged as three back holes, three breast holes, three cut holes, and three lifters. A round is drilled and blasted each shift, advancing the drift about 2 ft. each round. The cut holes are about 3½ to 4 ft. deep, while the back holes are only a little over 2 ft. deep. The round is blasted down upon a floor of planks, so that the shovelers have a good chance to shovel. The drills are run both on day shifts and night shifts; but the muck is only shoveled and hoisted on day shifts at present.

It may seem queer that two men work on these small drills, but the Grant County mine is very wet, and it is doubtful if one man could muck back and get in the 12 holes in a shift. Besides, as the drifts are very wet the fuse has to be lighted as cut, so that one man would be hurried in blasting and probably missed holes would be frequent. As it is now, there are hardly any missed holes, so that probably this practice is not so bad as it looks.

Mining in Ecuador.

According to Alfred Cartwright, British consul at Guayaquil, during the period of 1899 to 1905 the mining enterprises in and around the Esmeraldas province continued at a large expenditure of foreign capital, but without any practical result so far, and, according to unbiased opinion, without the prospect of any successful result in the future.

The Zaruma gold mines, abandoned by the English company in 1899, have been taken up and worked by the South American Development Company, of New York. The produce has been exported in gold bars and cyanide slimes to San Francisco for treatment. The quantity produced from 1902 to 1905 has been about as follows:

ST. ROSE MILL.

Year.	Gold.	Slimes.	Total.
1902	£12,700	£16,600	£28,300
1903	11,500	7,000	18,500
1904	15,700	26,200	41,900
1905	17,700	17,800	35,500
Total.....	.....	.....	£124,200

Most of the other mines, situated at different points in the Republic, have been abandoned during the last six years.

Hydraulic Filling of a Coal Seam at Lens, Pas de Calais, France.*

BY LIONEL R. HILL AND MALCOLM BURR.

In general this process consists in washing down any form of débris by water, and filtering it at the place to be filled, so that the water runs off and is collected in settling tanks, while the débris remains as a dry and solid bank tightly packed up to the roof. Hand packing is inefficient; the most careful packing only fills up about 60 per cent. of the space, whereas the hydraulic method fills up the space practically completely. The cost of hand-packing varies with conditions, but if we take an average of 25c. or 30c. per ton, the hydraulic method shows a great economy.

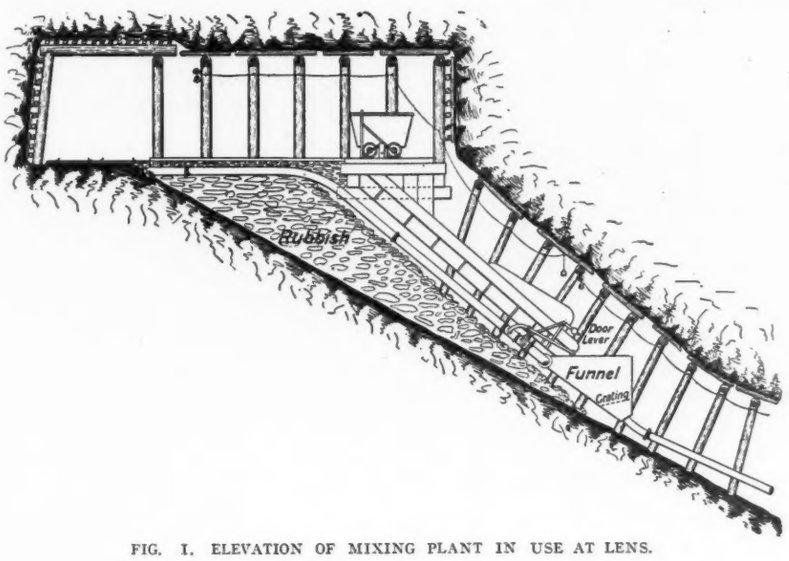


FIG. 1. ELEVATION OF MIXING PLANT IN USE AT LENS.

At mine No. 1 of the collieries of Lens, in the Pas de Calais, sand, the best material, is difficult to obtain, and shale from the washers is used. It is sieved into two sizes, viz.: 0.16 to 0.40 in. and 0.40 to 1 in. The two sizes are mixed together in varying proportions.

The shale is taken underground, in ordinary cars having a capacity of about half a ton of coal, to the 243-m. level at the end of the morning shift, the cars being collected in a gangway in the upper part of the seam, where there is space for 100 of them.

The result of experiments shows that the best material available at Lens is a mixture of two sizes of shale, as the smaller particles fill up the crevices between the larger ones; it follows also that a mixture of shale with sand would be better still. One experiment showed that a mixture of only 10 parts of pure sand to 90 of shale increased the resistance to crushing considerably; under a pressure of 967 lb. per sq.in. the compressibility of shale alone was 10.2 per cent., but with 10 parts of sand it was only 3.3 per cent.

The water is pumped from the underground settlers into a main reservoir having a capacity of 72,600 gal. In case of shortage of water, the pump at the 334-m. level can supply the reservoir with water from the mine, which makes an average of 154,000 gal. per day. The main pipes leading from the reservoir to the mixing plant have an internal diameter of 4.7 in.; there is about 560 ft. of these pipes; the head of water at the mixing plant varies from 13 to 16 ft., according to the hight of water in the reservoir. With the increased area to be treated by this process, it was found that this pipe was insufficient, so a second similar pipe was put in. These two pipes convey about 440 gal. per minute.

As a rule the cars are run into a tippler over a funnel, the plant being at the surface, or at the top of an air-shaft underground. At Lens, the plant is installed at the top of a disused incline as shown in the accompanying diagram. The cars are drawn up on rails to a turn-table near the tippler. The shale falls upon a sheet of steel, set at an angle of 40 deg.; at the foot is a wooden door, working about a horizontal axis, controlled by a man, who can thus regulate the amount of shale that passes, and insure an even supply into a large funnel, where it is mixed with water.

Across the funnel there are three pipes; two of these cross horizontally; they have a diameter of 4.7 in. and are each pierced with 56 holes of 0.47 in. diameter. These pipes are filled with water from the main, which jets out from the rows of holes into the funnel, where the shale and water are thoroughly mixed. The shale is admitted regularly by a man who holds the wooden door. The funnel is lined with sheet steel, and at the bottom there is a grating which stops any large pieces that may find a way in. The third pipe, also with a diameter of 4.7 in., is not perforated, and points straight down the funnel, its object being to provide a powerful jet of water to flush out the pipes when necessary. From three to four parts of water are mixed with one of shale. From the bottom of this funnel the shale and water are conveyed in pipes to the face. These pipes are of mild steel, with an internal diameter of 6.2 in., and a thickness of 0.02 in. Each piece of pipe is 13 ft. long, and weighs about 244 pounds

The pipes turn corners by elbows, which had formerly a radius of curvature of 4.9 ft., but now a radius of 14.7 ft., which has greatly reduced the resistance. The elbows are divided in three pieces, in order to admit of easy manipulation and modification.

When the process was first installed, it was found that the jet of shale and water escaping from the pipes did not fill the mouth. Consequently a certain amount of the suspended material settled in the bottom of the pipes. It was found later that this settled into a compact mass like the bed of a river; the level of the mass in the pipe tended to rise whenever there was a sufficient horizontal extent, and finally the pipe became blocked. This caused great inconvenience and necessitated unfastening. This difficulty is now overcome by ending the pipes with one of 4.9 in. diameter. By this means the jet is entirely filled to the mouth, so that suspended material is not allowed to settle, and the necessary volume of water is greatly reduced. This small detail made a great improvement in the efficiency of the process.

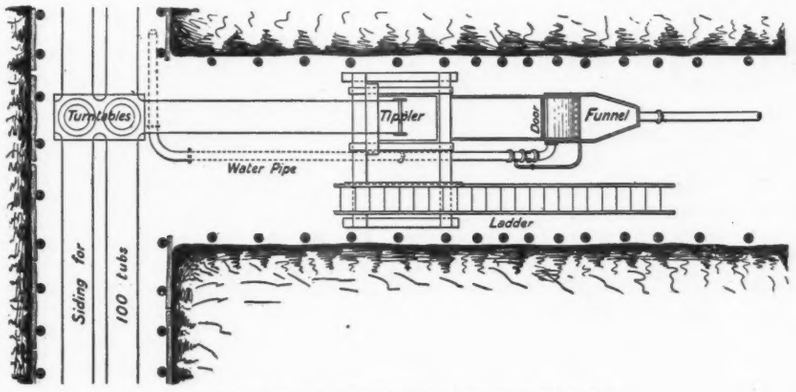


FIG. 2. PLAN OF MIXING PLANT IN USE AT LENS.

*Abstract of a paper read before the Institution of Mining and Metallurgy, Feb. 15, 1906.

The process is employed in a seam which is 3 ft. 3 in. thick, with a dip of 21 deg. The length of face under operation is about 810 ft. The seam is worked partly by roads parallel to the strike, and partly by roads parallel with the dip. The area under consideration is worked by the former method.

The roads are 65 ft. apart, and the face between is cut in steps of 33 ft., the lower portion being 4 ft. in advance of the upper; six miners work at this face, while there are three boys who push the coal in the steel chutes down the slopes into the cars, which are pushed to the main roads by other boys.

As soon as the face has receded 16 to 20 ft. it is filled in by the hydraulic process, the area to be filled being composed of strips 4 ft. wide, i.e., the width of each step in the face. As a rule three of these strips are packed at one shift, making a total width of about 12 ft.; occasionally they do four, making a width of 16 ft., with a length of from 65 to 100 ft. along the dip, that is to say, the distance between two roads.

The place to be filled is surrounded by planks arranged vertically. These planks support a series of cloths, which retain the shale, and allow the water to pass through. In order to make this wooden framework tight and to prevent the escape of the shale, it is mounted on iron cap- and foot-pieces which fit firmly into the floor and roof. The planks employed are about 4 in. wide, and are put up at intervals of 2 in. to allow the water to escape; the slope of the ground insures the regular filling of the shale.

Before filling a space in this manner, the planks and framework of the place previously filled are removed. This exposes the shale of the previous day's work, which is found to be perfectly firm and sufficiently solid to stand by itself without support. As much stull timber is drawn before filling as circumstances will allow, the amount depending, of course, upon the condition of the roof.

Below the lower level there is a reservoir with a capacity of about 1760 gal., divided into four compartments. The water passes from one to the other, gradually depositing the matter in suspension, which amounts to about 3 per cent. of the volume of shale sent down.

The limit of horizontal transport depends upon a variety of considerations, such as the head of water, diameter of pipes, material employed, quantity of water, curves in the pipes, etc. At Lens the horizontal distance is insignificant, but at Myslowitz, Silesia, the head is 720 ft. and the horizontal distance is about 550 yd. At Hedwigswunsch the head is 656 ft. and the horizontal distance is about 1100 yards.

The cost at Lens is approximately as follows: Filling cars with shale at surface, 0.089 fr.; transport underground, tipping, filling, 0.160; setting up frame work, tubes, etc., 0.106; cleaning out roads and basins, 0.013; sundry, 0.029; total labor, 0.397; water, at 0.034 per cu.m., 0.027; planks and cloth, 0.018; grand total, 0.442 fr. per cu.m. filled, or about 8c. per cubic yard.

At the Ferdinand mine in upper Silesia, the material employed is almost entirely sand, but they also use mud from the roads, rubbish from houses, cinders, stones and sweepings. The pipes wear out gradually, and they should be rotated about a quarter of a turn every three or four months, in order to distribute regularly the wear. The pipes last from two to two and a half years at the Ferdinand mine, where they are made of 0.27 in. iron, with an internal diameter of 7.9 in.

At the Myslowitz mine, also in Silesia,

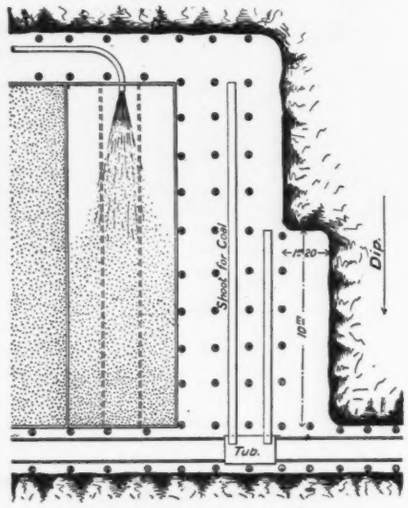


FIG. 3. HYDRAULIC FILLING IN OPERATION.

after two and a half years, the cost of hydraulic filling has been worked out at 49 pfennigs, or 12c. per ton, which is just half the cost of filling by hand in the neighboring mines. The packing at this colliery has stood the test of time so far, and shows perfect solidity, with no settling.

Carborundum Manufacture in Germany.

The Carborundum Company, of Niagara Falls, N. Y., has begun the construction of a plant in Germany, the demands of its European trade having increased so rapidly that the establishment of a branch works on the Continent became necessary. A German company has been formed under the title "Deutsche Carborundum Werke, G. m. b. h." The new works are located at Reisholz, near Düsseldorf. Five kilns for the manufacture of vitrified wheels are provided for, two of these to be built at once. It is expected that the new works will be in operation by Jan. 1, 1907.

The sand blast offers a convenient test for the durability of building stone.

Centrifugal Pumps.

BY RICHARD C. WILLIAMS.

The general design of centrifugal pumps must be the result of long experience and the selection of pumps by mine owners is a problem which can be safely entrusted by them only to those thoroughly conversant with the peculiarities of pumps. Only recently have mine operators realized that the centrifugal of the present day is a machine even more efficient than the reciprocating pump. This result has been obtained by close study for over 25 years by the larger engineering companies of the country. Today there are no secrets as to the action of the centrifugal, the "why" of its operation, the "where" of its efficiency; the problem is boiled down to that of incorporating within the solid material the ideas which theory and mathematics dictate as being correct. Many thousands of dollars have been spent in determining just the particular curve for an impeller blade, exactly the size of the inlet opening or water passages.

A company supplying power can afford to have the best engines and most efficient ones, even if they do cost more, because it is their capital. Likewise a mining company should have the best pumps that money can buy, for it is just as much a part of its work to clear the mine of water as to remove ore or coal, and, since the first steam engine was installed by Watt to pump water from an English coal mine, the aim has been to handle water more efficiently. It is obvious that a centrifugal is more economical in expense of maintenance than a reciprocating pump, for there is no expense for oil, for pistons or valve replacements, which alone would pay the interest on a centrifugal installation.

The construction of a centrifugal pump is based on the fact that there is only one moving part, the impeller. With this noteworthy feature comes freedom from wear and the ability to handle large particles of solid matter, such as mud, sand, sticks, ore, and even fair-sized stones, without in any way interfering with its operation. It is but recently that centrifugal pumps have been able to operate economically against pressures exceeding 60 ft. of water. One company with which I am familiar recently installed an eight-stage pump for a 1400-ft. head in California.

The centrifugal pump is essentially a mine pump, for its very design allows the best efficiencies at moderately high heads. This is because at low heads the frictional and eddy losses bear a high proportion to the amount of energy expended in pumping water. In the better high-lift turbine pumps the friction and impact losses are reduced by nozzle-shaped openings in the casings. The water is discharged by the impeller into the small end of these nozzle openings, and, by pasage away from the center of rotation,

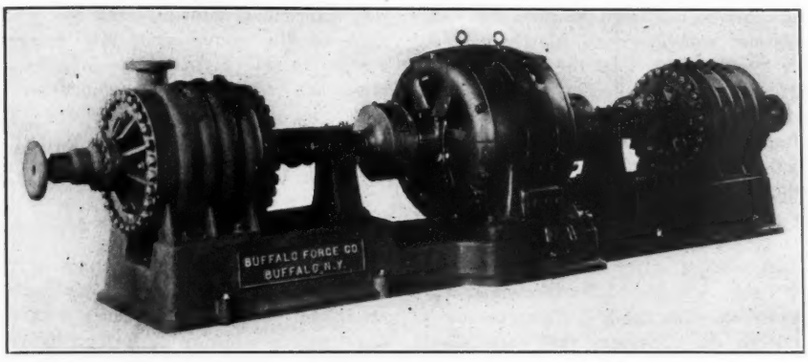
its velocity acquired through centrifugal force is gradually reduced by the increase in sectional area of the water passage.

The nozzle above referred to, called by engineers the diffusion ring, allows pumps with a single impeller to deal with heads above 100 ft. with marked economy. The points determining the efficiency are the diameter of the impeller, its width, the speed of rotation, and the discharge required. Where unusually high heads of between 1300 and 1500 ft. are called for, it is customary to place two multi-stage pumps in series, it having been found that a single multi-stage turbine pump finds its practical limit at about 700 feet.

A problem in the design that requires very careful figuring is that of balancing the impellers against the thrust of the incoming water. If the pump be made with a single impeller and suction on one side, then the thrust must of course be taken up by using some type of thrust bearing. If the pump be constructed with double suction, then the problem solves itself, for the thrust experienced by the impeller due to water approaching axially is the same on one side as the other. In the layout for multi-stage pumps the problem is not so easily solved, for if the water be led to the right-hand side of one impeller and to the left-hand side of the next, it involves very expensive core work in the design of the casing; but this pays in the long run as shown by the experiences of many makers. The thrust may also be regulated to some extent by proportioning the areas of the impellers.

The question of accuracy of construction with regard to packing rings to prevent leakage from one stage to the next and to forbid leakage of air into the suction end of the pump is one of paramount importance. If air be allowed to get into the pump it will not operate at all, as the expansive volume of a small quantity of air is almost unlimited when it is introduced into a heavy vacuum, and consequently will fill the entire suction pipe. The clearance between impeller and casing also is of importance when the question of solid particles which can pass through the pump without injury to it is considered. These are specifications which must be in the hands of the pump builder before he can intelligently make recommendations for any particular design.

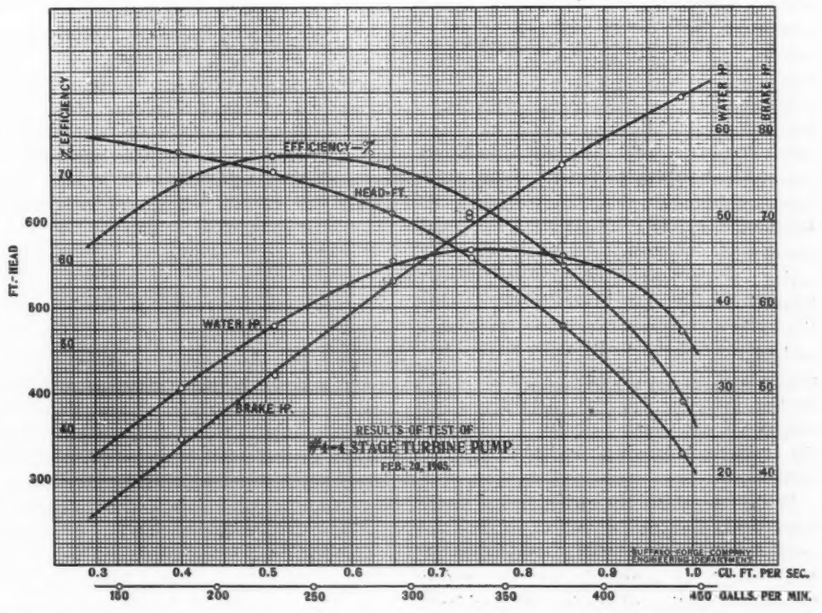
For moderate heads, efficiencies of from 70 to 80 per cent. are obtained for the most favorable discharge. If the discharge be too light, the power will be absorbed by the impeller in churning the water and in this case it indicates too large a pump for the work intended or a pump with too high a speed. In the instance of a multi-stage pump, it is considered best that provision be made for measuring the pressure in each stage so that any leakage could be at once detected and directly localized so that it can be remedied.



TURBINE PUMP.

Careful tests of well constructed pumps after years of use show remarkably small loss in efficiency due to corrosion and leakage. In fact, the durability of the centrifugal pump is so superior to the reciprocating type for mine drainage that the subject need not be longer considered.

For actual statement of tests of centrifugal pumps, the accompanying curves will serve to illustrate the form in which they are usually incorporated, for when graphically plotted the results are most easily seen. The curves shown are those obtained from a four-stage pump manufactured by the Buffalo Steam Pump Company, similar in type to one of the four-stage units used to make the eight-stage turbine pumps shown earlier in the article.



Official Report on the Courrieres Explosion.

The commission appointed by the French Government to investigate the manner in which the State engineers carried on rescue operations after the Courrières explosion in March, 1906, has just published its final report in the *Journal Officiel*. According to this, which we condense from the summary in the *Colliery Guardian*, three separate periods were devoted to rescue work. Apart from the recovery of the bodies, the material damage was enormous, the explosion having caused numerous and important falls from Pit 2 to Pit 4. From the declarations made by men who had escaped from the disaster the principal passages had been traversed and ravaged either by the flames, or by the violent rush of air, or by irrespirable gases from Pit 3, where the explosion originated, up to Pit 4 on the one side, and to the neighborhod of Pit 2 on the other. During the first period of rescue work, the principal engineer of the Courrières company, who had constructed the barriers to shut off the fire in the Cécile seam, turned his attention exclusively to restore the suspended ventilation in Pit 3. Other engineers in the meantime put in order the Pit 11 cage, descended to explore, and encountered nothing but falls, bad air, and corpses. At Pit 10, the engineers, Voisin and Peghearie, were soon incapacitated, the former being wounded, and the latter half asphyxiated. Their subordinates however, were able to continue rescue operations. The condi-

tion of the bodies recovered, some burnt, some torn and mutilated, and some asphyxiated, left little or no hope of finding survivors in the portion of the mine directly affected by the explosion.

When Chief Inspector Léon arrived on the scene the next day, and assumed direction of the rescue operations, he could do no more than continue what had already been begun by the engineers of the company. On the evening of the 11th, it was recognized that any further hope of finding survivors might be abandoned, and that the only thing left to do was to send up the bodies as rapidly as possible. In order to protect the rescuers, M. Delafond, who had been sent to assist M. Léon, ordered the reversal of the air current. All efforts were now directed to removing the bodies and extinguishing the fire. On the 15th, a fire broke out in the Josephine seam at 800 m. distance from Pit 2. M. Delafond had then the full responsibility, as M. Léon had become ill from having remained too long underground. Three barricades were built up in the 340-m. level, and a fourth barricade in the 306-m. level leading to the Julie seam, from which it was feared the air would reach the fire in the Josephine seam. Mr. Léon returned to duty on March 19, M. Delafond being recalled to Paris by the Minister.

On March 22, M. Weiss, engineer, was sent from Paris to help M. Léon, and it was decided, as the fire had sensibly diminished, to remove the barricade on the 306-m. level, and begin the enlargement of the timber framing in the Julie seam. These operations resulted in the unexpected discovery of the 13 entombed miners. At once new arrangements were made. Notwithstanding the danger of venturing farther, everything was forgotten in the possibility that there might be other lives to save. From March 30, therefore, the third period of rescue work began and continued up to April 4, when Berthier, the fourteenth survivor, was discovered. On April 8 the State engineers, acting on the authority of the Minister, handed over to the Courrières company the task of putting the mines in repair, and of raising the bodies still left underground. This transfer was officially made in the presence of State engineers, the company's engineers, and the delegates of the miners belonging to the pits concerned.

With regard to the principle of State intervention in the direction of salvage operations, the report calls attention to the law, which is emphatic on the point. When the bodies of victims of accidents are not immediately withdrawn, and when there is reason to suppose that the mine contains survivors in danger, the authorities are bound to intervene. The State engineers, however, were confronted with the serious obstacle that the only engineers who were perfectly acquainted with the portions affected were among the victims.

The commissioners were naturally led to inquire into the question whether any men had perished in the mine after the explosion, and, if so, whether their deaths were to be attributed to the measures adopted by the State engineers in conducting salvage operations. Statements to this effect were vigorously supported by the dissentient commissioners, MM. Cordier and Evrard. The autopsy of four bodies brought up on March 30, and alleged to have shown signs of recent death, led to the following declaration of the official medical men present: "We find that these four men were first of all burnt, and that death ought to be attributed to poisoning by carbon monoxide. The state of the burns, which show no signs of having begun to heal, well indicates that death was not subsequent to March 10." All the evidence taken by the commissioners agreed that the victims met their doom at the time of the explosion, or very shortly after. "If many of the men succumbed directly to the flames, it is certain that many others were poisoned by carbon monoxide, or asphyxiated by carbonic acid, some at the very place they were working, others when seeking safety in flight. The men who thus succumbed for the most part calmly slept in death without having to undergo the sufferings that they would have undergone had they been blocked up in some narrow space to be tortured by hunger, or by the gradual rarefaction of respirable air."

In conclusion the report gives the following *résumé* of the inquiry:

"1. The rescue operations were from the beginning carried on by the State engineers, in accordance with the legal dispositions regulating mines in such cases. No agent of the company has any responsibility in this respect.

"2. There are no grounds for the assumption that miners who escaped asphyxia at the outset perished later on in the mine owing to the lack of succor that could have been given them.

"3. The rescue operations were particularly difficult owing to the exceptional extent and condition of the affected galleries. The program and the means adopted for the execution of the works were in accordance with mining practice, and were necessitated by the particular circumstances of the accident. The adoption of extreme measures for clearing Pit 3 was very properly omitted by reason of the dangers that might have arisen, and the very serious consequences such measures might have had for the necessary salvage operations. Pit 3 being inaccessible, the reversal of the air current was justified by the apprehensions that were rightly entertained in the opinion of the delegates, especially as to the intensity of the Cécile fire, and the accompanying danger. This measure gave, in the circumstances, the most sensible form of ventilation; it contributed to the disappearance of the mephitic gases that had prevented any early approach to the 13 survivors. The establishment of the barriers in the levels leading to the Josephine and the Julie seams was necessitated by the new fire that broke out in the Josephine seam after the accident. This fire created an extremely perilous situation for the rescuers, and necessitated the adoption of very prudent measures to prevent a new catastrophe. These barriers, during the time their maintenance was considered necessary, could not be injurious to any survivor. In consequence, the majority of the commission are of opinion that no reproach can be made to anyone soever for the manner in which the rescue operations were organized and carried out."

The report is signed by Adolphe Carnot, inspector-general of mines and president of the commission, and countersigned by M. Kuss, chief engineer of mines and secretary of the commission.

Copper Deposits in the Saline Valley, California.

BY RANDOLPH E. FISHBURN.*

Saline Valley is about 35 miles northeast of Keeler, Inyo county, California. Its copper deposits have been known for about 20 years, but owing to their inaccessibility and low grade they have heretofore attracted nothing but passing attention from mining men.

The ore is found at the contact of lime and granite. So far there has been comparatively little work done on any of the claims. The surface showing is extensive and the ore zone varies in width from 10 to 40 ft.; in places it is even wider. Numerous samplings of ore where exposed gave an average value of 3 per cent. copper and $2 gold and silver. The ore so far encountered is self-fluxing.

Last February these properties were examined by W. Y. Williams for Spokane parties, who, however, went no further in the matter. These are four principal groups of claims, viz.: the Mairs, Sanger, Spears and Anton. The Spears group is under bond to Samuel A. King and associates of Salt Lake City, and active work has been started on this property. The Mairs and Sanger groups are under bond to J. F. Mitchell and H. C. Heffner and work on these is to be started in the near future. It is possible that with development work a new and important copper district may result.

The success of the aluminum works near the Falls of Foyers, Scotland, has led to a scheme for the construction of similar works on a much more extensive scale at Kinlochleven, on the borders of Inverness and Argyll. The place has an abundant supply of cheap water power. The catchment basin has an area of 55 sq. miles and rainfall in this district is said to be one of the heaviest in the United Kingdom.

*Mining engineer, Lone Pine, California.

The Rife Hydraulic Ram.

The general idea of a hydraulic ram is that it is a small machine, suitable only for raising a small quantity of water; but in reality there is practically no limit to the size of apparatus of this type, capable of operation at a high degree of efficiency. As a means of raising water, it has the advantage of possessing only a few wearing parts, and being capable of operation practically without attention or expense. A modern and improved form of hydraulic ram is made by the Rife Hydraulic Engine Manufacturing Company, of New York City. It is claimed that this ram will pump with good efficiency against heads of 25 to 30 times the amount of the fall, although of course the efficiency decreases as the ratio between the power head and pumping increases. Thus, at the low ratio of about 3:1, these rams will have an efficiency of over 90 per cent., whereas at a ratio of 12:1 or 15:1, the efficiency will be about 70 per cent. Where the water fall is from 2 to 50 ft., the rams will deliver approximately one-third of the water 2.5 times as high as the fall, one-sixth of the water five times as high as the fall, and one-twelfth of the water 10 times as high as the fall.

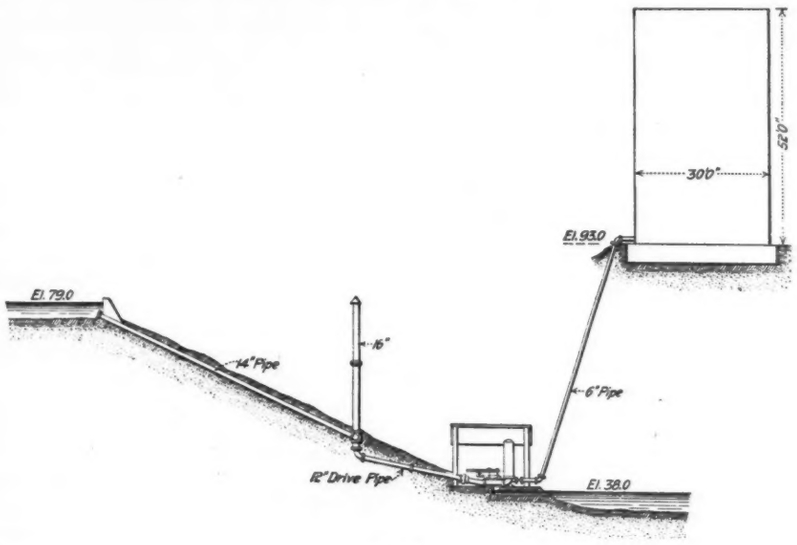


FIG. 1.

The accompanying engravings show an installation of large hydraulic rams for the water-supply system of the United States naval coaling station at Bradford, R. I. The plant consists of two rams of improved type, as shown in Fig. 1. The delivery pipes from the rams are connected with a 6-in. pipe, leading to a standpipe 30 ft. in diameter and 52 ft. high, the pumping head on the rams, exclusive of friction, being 105 ft. when the standpipe is full. One of these engines has a capacity, measured by the power water utilized, of 800 gal. per min., which at a pumping head equal to three times the driving head would enable it to deliver 200 gal. of water per min., at an efficiency of 80 per cent. However, they may be adjusted by regulating the stroke of the working valves to operate continuously on a supply as low as 200 gal. per min. The efficiency guaranteed in the contract was 70 per cent., but carefully conducted tests have shown average results considerably higher.

Geological Survey of Illinois Coalfields.

The work of the State Geological Survey on the coalfields of Illinois is going rapidly forward. A large number of mines already have been visited, and careful samples taken for laboratory study, 160 such samples being now on hand. Director Bain recently visited the Livingston and La Salle county fields, preparatory to making careful surveys. J. A. Udden is now engaged in working out the faults near Peoria which have been such a constant source of annoyance and expense to operators in that vicinity. T. E. Savage is making a detailed study of the Springfield mines. J. J. Rutledge has taken up an investigation of the coals of the East St. Louis-Belleville area, and F. W. DeWolf is about to begin work in Saline and Gallatin counties. His work, as also that of David White, who is making collections of fossil plants throughout the field, is carried on by the U. S. Geological Survey in coöperation with that of the State. Topographic surveys preparatory to next season's work are being carried on near Harrisburg, Marion, Herrin, Murphysboro, Trenton, Edwardsville, Alton, and Tallmla. A preliminary report upon the composition and character of Illinois coals is in press.

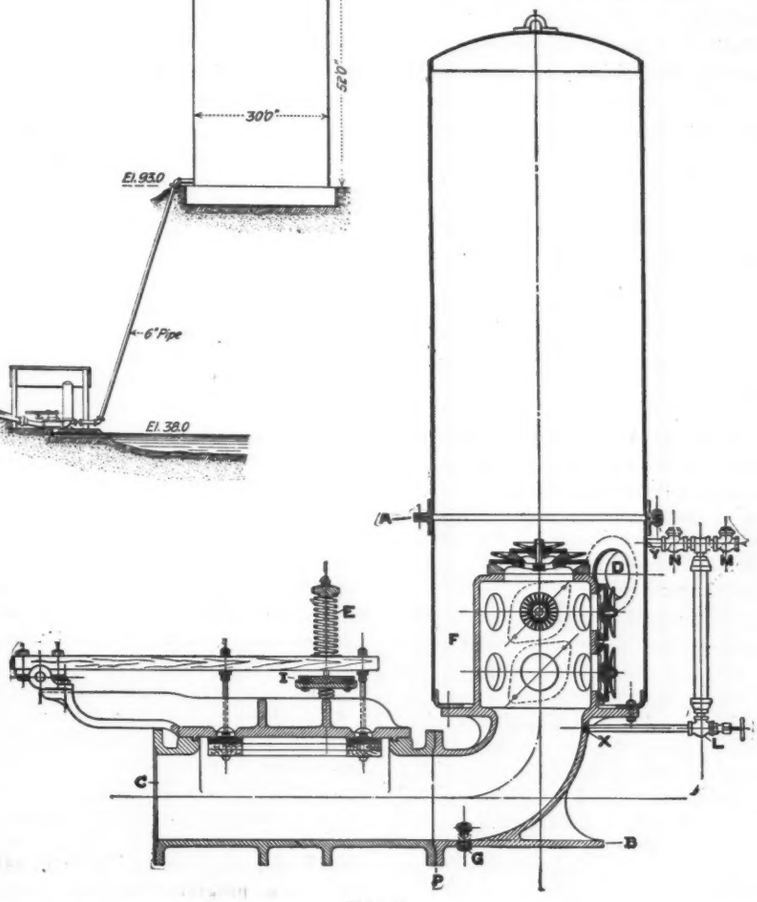


FIG. 2.

The Washoe Smelter.

According to the testimony of E. P. Mathewson, general manager of the Washoe smelter, before the master in chancery in the farmers' injunction suits against the Washoe smelter, at Butte, Mont., Sept. 11, the output in metals of the Washoe smelter for eight months of 1902 and for 1903, 1904 and 1905, and the first six months of 1906, has been as follows:

	Copper, lb.	Silver, oz.	Gold, oz
1902	82,992,361	3,368,183	15,027
1903	109,726,420	5,190,879	31,183
1904	138,078,499	6,481,318	46,344
1905	165,505,144	7,046,485	49,685
1906	94,244,911	3,811,735	22,567

The smelter employs 2100 men. Since 1902 the gross value of the ores handled has been $104,316,089. The biggest items of expense have been: $7,007,324 for labor, $4,293,455 for coal, $4,012,000 for coke, $740,047 for lime rock, $1,316,020 for machinery, $53,896 for lumber and $1,480,813 for freight.

Metallics.

The crust of the earth, so far as we can examine it, contains only about 20 out of the 75 or more elements, and of these 20, only eight are present to the amount of more than 1 per cent. of the whole.

In the United States, portland cement is gradually replacing natural cement. In 1905, many of the largest natural cement plants were idle or were being remodelled for the manufacture ot portland cement.

A 3⅛-in. rock-drill, at full work, has been found to require 28 to 32 i.h.p. at the compressor, but the actual power used against the rock was determined in a certain case to be only 1.7 h.p. On the basis of 28 h.p. at the compressor, consequently, the efficiency of power at the drill bit was only 6 per cent.

Important deposits of asbestos, equal in quality to the Canadian, are said to exist on the Chinese border of the Ussinsky province of Siberia in a territory that is in dispute between Russia and China. It is expected that the ownership will be settled eventually in favor of Russia, and that these deposits, together with other mineral wealth, will then be exploited.

A strong demand is growing in the United States for a pure white or colorless cement, no supply of which has yet been produced here. There are numberless deposits of limestone in this country that are practically free from iron and discoloring matters, and it is believed that a white cement can be made. Cement can be decolorized by the addition of volatile salts before calcining.

Roller bearings for car wheels are likely to be cheaper, to require less attention, and be more serviceable underground, than half bearings. The following proportions for wheels of 8 in. to 12 in. diameter have been suggested by an experienced engineer, viz., wheels of cast steel, a 1½-in. axle pin, hub of wheel 4 in. long, recessed to hold 12 half-inch rollers 3 in. long. The rollers may be cut from cold-rolled steel bar, the ends being merely rounded off. No hardening is necessary.

The workable gypsum deposits of the United States occur in only a few geological horizons. The Saline group of the Silurian carries large gypsum deposits which are worked in New York, Ontario, Ohio, and Michigan. The lower Carboniferous carries gypsum in Virginia, Michigan and Montana. Most of the deposits west of the Mississippi occur in Permian or later rocks. These three geological series, therefore, carry almost all the workable gypsum in the United States.

The oxidized gold ores of the newer Nevada camps are tested by pulverization in iron mortars and panning in small frying pans. These pans are admirably adapted to panning in half barrels or gasolene cans with a side cut out, such as are used in these dry countries for holding the panning water. Many prefer these pans to the regular rubber spoons made for "horning" ores. After a few check assays an experienced man can estimate with fair accuracy the value of the ore.

At several mines in Europe small compressors, electrically driven, have been installed underground, each compressor serving a group of drills. The compressor, motor and receiver are sometimes arranged on a truck, which can be moved to follow the development of the mine. The electrical cable is wound on a drum, enabling the easy adjustment of the length. The efficiency of these installations has been found very good. By this method the theoretical advantage of the electric drill is approached, while the practical advantage of the air drill is retained.

For hoisting in the newer Nevada camps, where freights are high and fuel scarce, electric hoists are generally considered the most economical wherever electricity can be brought in, as at Goldfield and Tonopah. In one case, oil-fired boilers and steam hoists are used, but generally gasolene hoists are employed. These gasolene hoists have been so perfected that they are now satisfactory and reliable. Those used in Nevada range from 15 h.p. to 60 h.p. Two makes used are the Fairbanks-Morse and the Hercules, the former being the more popular, but according to the operators both are quite satisfactory.

The density of the earth as a whole has been estimated, with close agreement among the several scientists who have made the determination, by different methods, to be about 5.5, or 5½ times as heavy as an equivalent sphere of water. On the other hand, the average density of the materials forming the accessible portions of the earth's crust is between 2.5 and 3.0, so that the mean density of the whole globe is about twice that of its outer part. This indicates that the central part of the earth is composed of heavier materials, and may even be metallic, which condition would accord perfectly with the nebular hypothesis.

In the Körting system of water-spraying ventilator for mines, the motive power is obtained from a cone of finely sprayed water from a spraying nozzle. When the pressure of water is constant the cone develops with a certain speed, and comes into contact with the inner sides of the apparatus, to which a suitable form is given. The useful effect of this ventilator attains 50 per cent. and upward. The air is considerably cooled, humidified, and purified in passing through the cone of sprayed water. In an underground engine-rom one of these ventilators cooled the air from 35.3 deg. C. to 24.5 deg. C., the power water being at a temperature of 19 deg. C.

In a mine in Nevada the use of short rails in advancing drifts has been avoided by two methods of placing long rails. In both methods the long rails are laid lapping the last rails in place, and are moved ahead as the drift advances. In one method, the rails are placed on their sides inside the track, rail heads toward each other. The rails are spiked in this position so that, when the car passes off the track the wheel flange runs in the groove of the rail. In the other method, the rails are placed on the outside of the track with the bottom of the rail up. These rails are given a slight batter toward the center of the track so that the wheels will catch the rails. As the drift is mucked out the rails are pushed ahead. Both these methods have worked well.

At the Centennial-Eureka mine, Tintic, Utah, the slash system of mining was tried. Owing to the fact that the limestone capping was quite strong and did not cave well it was necessary to create an artificial gob to follow down after the stope was caved. This was done by blasting down sufficient limestone to make a gob 20 ft. thick at the beginning. The limestone waste sorted out of the ore and left on each floor at the time of caving the floor, and also the caved timbers, helped increase this gob rapidly and no trouble was experienced from the falling of large slabs from the dome of limestone above the artificial gob. However, the slash system was finally abandoned at this mine, not because of any difficulty due to the artificial gob, but because a sufficiently large daily tonnage could not be extracted by this method, owing to the limited number of working faces possible when the system was used at this mine.

The benefit derived from air drills in a mine through improvement of the underground atmosphere is frequently mentioned. There is no doubt as to the correctness of the theory. However, this would not be a rational argument for the retention of air drills if electrical drills should show equal mining efficiency, because the ventilation of a mine through the medium of an air drill is much more costly than ventilation by direct means. For example, a compressor at the Vieille Montagne mine, compressing air to 73 lb. pressure, was found to be requiring of the driving motor 2.46 kw. per 1000 cu.ft. of free air per hour. On that basis the supply of 75 cu.ft. of air per man per minute, which is prescribed by some mining regulations would require 13 h.p. per man, if the ventilation were effected only by means of compressors, taking the pressure at 73 lb. By the use of a fan, on the other hand, only about 0.113 h.p. would be required. This argument does not merely apply to electric drills vs. air drills, but also to underground compressors vs. surface compressors for the operation of air drills.

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Electric Drills vs. Air Drills.

In a communication published elsewhere in this issue, Mr. Chase continues the discussion on this subject, giving the results of experience which cannot fail to force the conviction that in the Liberty Bell mine the electric drills have been a success. However, it is to be remarked that the Temple drill is still a species of air drill, to which the power is conveyed electrically. In respect to efficiency of service, low cost of maintenance, and the practical indestructibility which characterize the standard air drill, at the Liberty Bell mine, the Temple drill, after two years of usage, which certainly is a sufficient length of time to warrant comparisons as to those vital points, has proved the equal of the air drill. Admitting the accuracy of that conclusion, the comparison between the two types of drill is reduced to the feature which the designers of electric drills have always had chiefly in mind, viz., the relative economy of power. On this point, Mr. Chase is able to present some explicit data. With the 3¼-in air drills the motor input at the compressor, i.e., the actual energy delivered, was 50 h.p. for two drills, or 25 h.p. per drill. With the electric drills, the crews of which accomplished somewhat more work than those of the air drills, the consumption was only 5 h.p. per drill, a figure which corresponds almost exactly with that reported by Mr. Barnes as the experience in the Yak tunnel, at Leadville.

Such results as these make reasonable the hope that the electric drill will soon find general application, and will be a means of realizing the great economy that has long been expected of it. We doubt if mine managers generally realize how wasteful of power the standard air drill is, because the published data on this subject are by no means extensive. It was stated in a recent report of the State Mining Engineer of the Transvaal that 2300 air drills were in use in South Africa at that time, of which 70 per cent. were of the 3¼-in size, each drill requiring 12 i.h.p. of the steam engine to run the two-stage compressors supplying the air. In a six-hour test at the Rose Deep mine, 31 drills (3¼-in.) required an average of 12.7 i.h.p. of the compressor engine. These figures are averages. Of course, it is well known that the time during which the drill is actually at work, i.e., striking blows, is rarely more than 70 per cent., and frequently not more than 40 per cent. of the length of the shift, wherefore the general average of power consumption is less than that of the drills at full work.

At a recent meeting of the South African Association of Engineers, C. E. Hutton, in an elaborate paper on this subject, reported the determination of 28 i.h.p. per 3⅛-in. drill, running. His conclusions were confirmed, in the subsequent discussion by K. Schweder, who made some well known rock-drill tests about 10 years ago. Mr. Schweder called attention to his determination that the actual energy imparted to the rock by a 3⅛-in. drill is only 1.7 h.p. On the assumption of 28 h.p. at the compressor for the fully worked drill, the efficiency at the drill bit is only 6 per cent.; but if computed back to the potential energy of the coal it is only 0.6 per cent., or thereabouts. This is a good illumination of the range of possibility for improvement in the art of drilling rock.

The cost of a horse power in mining practice varies widely, but we venture to say that in the country west of the Rocky Mountains it is seldom less than $100 per annum when generated from coal. Eight-drill mining plants are common, thirty-drill plants are not uncommon. It is easy to see how rapidly economy in power consumption, all other conditions remaining equal, would mount up. The subject is an important one, and fully worthy of all the attention that inventors and engineers have given, and are still giving, to it.

Coal-Mining Conditions in Ohio.

A rather unfavorable view of present conditions in Ohio coal mines is drawn by George Harrison, chief coal-mine inspector of the State, in a circular recently issued. This calls attention to the fact that in the month of July there were no less than 15 fatal accidents in Ohio mines, while in addition nearly twice that number were injured. Falls of roof and blown-out or carelessly placed shots were the chief causes; but several were the result of electric wires insufficiently protected. A majority of the accidents, the mine inspector believes, could have been prevented by proper care.

The underlying cause seems to have been the lack of proper discipline. The mine laws of Ohio, while not perfect, constitute a fairly good body of regulations; but there is a disposition to neglect their provisions whenever it can be done.

Both miners and operators seem to be blamable. It might naturally be supposed that a coal miner would have regard for his own safety; but everyone who has been concerned in coal-mine operation knows that men will run all sorts of risks to save themselves a little trouble. Many operators charge that the success of the unions in the West has interfered with the discipline necessary to the safe and proper operation of mines; that the union men are inclined to disobey orders and defy authority. To some extent this is probably the case, though it must be said to the credit of the union leaders that in some notable cases they have refused to interfere when a member had suffered through his own fault.

On the other hand there is a disposition among many operators to favor the mine-boss who can show the biggest results in getting out coal, regardless of the condition of the mine; in other words, to look to the immediate result rather than to the future. Competition is sharp and orders must be filled; so new work is pushed faster than the proper timbering and ventilation. Of course, this is wasteful policy in the long run; but today counts for much more than tomorrow with many operators.

The blame for the high proportion of recent accidents in Ohio seems to be divided among careless and insubordinate miners, incompetent and negligent mine-bosses and short-sighted operators. The Ohio inspector has only done his duty in calling attention to conditions which he is laboring to improve.

Dredge Troubles in California.

Some people in California seem hard to satisfy, and the precautions taken to prevent damage by gold dredging are not yet sufficient to meet their objections. Now, an agitation has been started in Sutter county over débris in the Feather river, and this time the blame is laid on the mining dredges at Oroville. These dredges are, however, all "landlocked;" that is they are working in inclosed basins which have no outlet to the river, and the tailings are thus kept out of the streams. The few machines which were working in the river proper, have dumped the rocks, etc., in such a way as to inclose themselves in separate float basins, not connected in any way with the flowing water of the stream itself. How they can put débris in the river under these circumstances, it seems hard to see.

By far the larger number of the machines at Oroville are working in basins a mile or two from the river, so that the tailings resulting from their work settle back in these basins at once, and can by no possibility reach the main river. Still the presence of an unusual quantity of débris in the stream has aroused the indignation of Yuba City men, who are trying to get the supervisors and the Anti-Débris Association to take steps to make a change in the present method of dredging. The owners of the dredges have taken every precaution to prevent these tailings entering the streams, or doing any damage; but some of the valley county men are so strongly prejudiced against all kinds of mining that they would like to stop the dredging altogether as they did succeed in stopping hydraulic mining. Of course, this is an absurd and short-sighted attitude.

Electrical Mining Hoists.

The article by Mr. Hamilton, elsewhere in this issue, on the subject of electrical mining hoists ought to receive careful attention, outlining as it does a new system, which in Europe appears to have proved itself an unqualified success. In the improvement of mining methods, engineers are looking toward the reduction of wastes, including the waste of labor, the waste of coal, timber, explosives and other material. In all of these particulars there is plenty of room for further saving; the orange has by no means been squeezed dry. Elsewhere we have commented on the subject of power consumption of rock-drills. The question of the hoisting engine is a problem falling in the same class.

The steam engine is of necessity an uneconomical motor when applied to mine hoisting, but in spite of its wastefulness, its advantages in other respects, or rather the disadvantages of its electric competitor, have operated against the substitution of the latter, just as in the case of the electric drill versus the air drill. However, the new system of hoisting, which is described by Mr. Hamilton, has been in operation, according to him, sufficiently long to prove its superiority, under certain conditions, to any other method of hoisting. As its merits become known it will doubtless early receive a trial in the United States.

In subsequent articles, Mr. Hamilton will describe the Siemens-Ilgner system in detail, reporting the figures of results actually obtained from it in European practice, and will discuss the mathematics of its principles.

September Sixteenth in Mexico.

As we anticipated in our article last week, the National holiday passed in Mexico without any serious disturbance. In fact, so far as we can judge from the press despatches, there was no disturbance at all. The Mexicans who have the best interests of their country at heart, and the Americans who have investments in Mexico, may congratulate themselves upon the utter failure of the mischief-makers, who have done so much to stir up trouble in the Republic, to consummate their purpose.

It is to be hoped that the portion of the American press, which, if not actually aiding and abetting the plots of a few insignificant conspirators, has promoted their cause by the attention given to their idle rumors and false reports, will now cease talking about sentiments which do not exists, save possibly in the minds of a few self-seekers and dissatisfied persons, and cease magnifying local disturbances which are nothing but police-court matters.

British Pig Iron.

The British Iron Trade Association reports that the make of pig iron in Great Britain in the first half of 1906 showed an increase of 283,824 tons, or 6.1 per cent., over the first half of 1905; the total this year being 4,905,124 tons. This indicates a total of close to 10,000,000 tons for the year. The gain was chiefly in forge and foundry irons and in basic pig; hematite, or bessemer pig, showing very little change. The heavy increase in forge and foundry pig would indicate only a small gain in steel made; but the classification is not very close, and a good deal of so called foundry iron may have gone into the basic-steel furnaces.

THE GOLD OUTPUT of the Witwatersrand in August was 509,115 fine ounces, against 491,793 ounces in July, all previous records again being surpassed. In only one month of the current year has there been a decrease as compared with the previous month. According to the present outlook, the total production of the district for the current year will be considerably in excess of $110,000,000.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Mills Mine, Wisconsin.

Sir—In your issue of July 28, on page 154, your staff correspondent writes: "At the Mills mine, near Hazel Green, a large concentrating plant is being erected, and a new method of magnetic separation is to be tried. The concentrate is to be roasted in a Trego calciner, and when cooled passed over an improvised Wenstrom separator."

The separator which we have put in at the Mills Mining and Reduction Company's plant is the invention of H. Guy Waring, of Webb City, Mo. For several years Mr. Waring operated one of these separators in a custom plant, located at Webb City, Mo., and the work was discontinued only when the mill burned down. Thus far we have not had a fair opportunity to test this separator in Wisconsin, as the Trego calciner does not successfully roast the ore from the Mills mine, the difficulty apparently being due to the fact that the ore leaves the furnace in an oxidizing flame, and consequently a certain amount of Fe_2O_3 is formed. In the Mathey kiln the ore leaves the roaster in a strongly reducing flame, and even if sesquioxide of iron has been formed in the earlier part of the roast, it is reduced to protoxide, and thereby rendered magnetic at the last moment; and if the roasted ore can be promptly quenched with water, the iron is in suitable form to be acted upon by the magnetic separator.

FRANK NICHOLSON.

Consulting engineer, Mills Mining and Reduction Company.

Joplin, Mo., Sept. 12, 1906.

The Lead Industry in British Columbia.

Sir—The lead industry of the United States affords an interesting study. The heavy consumption at home and abroad is reflected in the high prices prevailing. In the United States the absorbing of the surplus of imports over exports held in bond, the importations from Europe entering into competition with the domestic supplies in spite of a high tariff wall, the growing importance of the Cœur d'Alene district of Idaho as a factor in the metallurgical industry of the Western States, are all indicative of a scarcity of the commodity. The effort on the part of the dominant interest in lead smelting and refining to stimulate the production by the raising of the price scale, and the lowering of the treatment rates on lead ore is another proof of scarcity. In the light of the treatment charges quoted, it is plain that the dry-ore producer is being heavily taxed to afford the margin of profit for treatment, and in view of the scarcity of the lead collector the metallurgical industry must soon suffer a contraction unless an abundant supply is furnished. The prosperity of the United States is the cause of the heavy consumption, and the deficiency must be laid to the absence of new sources of supply, sufficiently developed to figure in the market. The industry is walled in by a tariff which affords little opportunity for relief from outside supplies. This tariff wall has forced the expansion of large and important metallurgical enterprises in both the countries to the north and south of the boundary lines. From the present time onward the United States will begin to realize the unwisdom of a tariff policy which checks metallurgical growth by the prohibition of the importation of free raw material.

Galena ore with silver content has two values: (1) For the metallic content; (2) its value as a collecting agent in the furnace, to extract the gold and silver of other ores.

It is the only collector occurring in nature in commercial quantity with a minimum of waste material in its shipping form, which allows of its standing long-distance transportation charges. Copper is an efficient collector, but its value in the utilization of dry ores is limited to those lying near the sources of supply.

The expansion of the lead smelting and refining industry of Canada and Mexico was directly due to the imposition of the heavy duties on the raw material into the United States. In the Republic of Mexico especially has the growth been remarkable, but today the supply of lead ore is stationary or dwindling, and for the sake of the second value alone it is of enormous importance in the treatment of the preponderating tonnage of silicious gold and silver ores. Should the United States abolish or reduce the duty on lead in ore, it is doubtful if the Republic could spare the commodity. For the safety of metallurgical investment and the welfare of the silicious ore producers it apparently would be compelled to prohibit the exportation, unless a suitable collector were found as a substitute.

The chief lead-producing province in Canada is British Columbia. The situation there differs radically from that in the Republic of Mexico. There the silicious ore production exists in quantity sufficient to absorb the lead-ore production; in British Columbia, the production of that kind of ore is an inconsiderable factor, the chief problem being to find a market for the surplus lead, either in the form of the raw material or the manufactured derivatives. This throws the onus of furnishing the profit for the smelting plants almost entirely on the producer of lead ores. The plants, being near to the seat of ore supply, are enabled to impose higher deductions for treatment, the difference between the rates to market and the amount saved because of shorter hauls being applied to the stimulation of the dry ore production. The second value of lead ore is lost completely to the producer thereof.

In order to realize to the full the two inherent values of the commodity and to realize also the benefits of manufacturing the derivatives of lead, the plain policy of the United States would lie in the direction of holding the present duties on the manufactured derivatives, and abolishing the duty on the raw material. This would draw the commodity in the raw state from British Columbia and would give to the full the benefit of the two values above mentioned. But this would open up a controversy with powerful interests in Canada, which have become strongly entrenched by reason of splendid facilities in smelting and refining, and the working up of foreign markets.

The present price basis which the British Columbia producer receives is that of the London market, which is considerably below that of the United States. The abolition of the duty on the raw material into the States would give a higher price, with a material lowering of the treatment charges. The two values would accrue to the producer, but the Canadian smelter having to settle on a lower price basis, with no other element from which to collect the margin of profit in treatment, would be at a decided disadvantage. The result would be that the Canadian plants would either have to meet the competition, or allow the ore to go out of the country, or content themselves with the treatment of grades undesirable for long-distance shipping.

The transportation question would become acute through the clash in policies. Two transportation companies are in the field, with radically different ideas for the development of their respective territories. One (the Canadian Pacific Railway) is a Canadian institution, its declared policy being to force the treatment of the ores on Canadian soil, to enable it to realize to the full the benefit accruing in haulage from the raw material to that of the finished product to market, with all the attending emoluments from the population drawn to the industry, in treatment and manufacture. This line has been the chief factor in furnishing the metallurgical facilities and dominates the industry. Added to this is another important feature, the abolition of the duty on the raw material would tend to draw it to the Western States, to metallurgical points the Canadian line could not reach, thus giving only a short haul, and completely depriving it of the benefits of manufacture. The influence of this transportation company is powerful with the provincial Government. The province has already imposed an export tax on logs to keep the

product from going to the Puget Sound saw mills, its purpose being to compel the erection of plants on Canadian soil. If we take the language of Hon. Robt. G. Tatlow, Minister of Finance for the province, as indicative of the future policy to be followed with regard to minerals, it is proof positive that the aim will be to safeguard Canadian smelting interests at the expense of the second value to the producer. In an interview given to the *Daily Province*, July 21, 1906, he says:

"As you know, in 1905 the mineral output of the province was $22,461,325. This was an extremely high figure for an industry only a few years old to reach, and the most satisfactory feature about it is that practically all was not only mined but smelted here. There are now 11 smelters and one refinery in active operation, with a combined capacity of 7500 tons per day, and very little goes out of the province in the form of ore. Should at any time an inclination be apparent to ship much mineral from British Columbia before smelting, I should be in favor of a similar course to that taken regarding lumber and prohibit such exportation."

Whether this view will rule when submitted to the electorate next year is an open question.

The other transportation company, the Great Northern Railway, has no metallurgical facilities along its Canadian lines, other than one dominated completely by the Canadian Pacific Railway, for the treatment of lead ores. In order to develop its territory its chief aim will be to afford all the competition possible in smelting and refining facilities and to give to its producers all the benefits accruing from a higher priced market, to render mining thereby profitable, which would mean the creation of a large tonnage. The treatment of lead ore on Canadian soil deprives it of the long haul and throws the haul on the finished product to its competitor, with whom it can only be divided, by a concession given, a feature which puts the railway at the mercy of conditions growing out of the strength of its opponent's metallurgical position.

The policy of the Great Northern Railway is legitimate and sound from an economic standpoint. It affords a means of correction for abuses growing out of monopolistic control and provides a market for a surplus which will always be a bugbear under present conditions. The abolition of the duty on lead ores entering the United States would afford the opportunity for the line to turn a stream of capital and expert mining talent into the silver-lead districts of British Columbia, whose operations would remove one factor threatening the extension of the smelting industry, that of fluctuating tonnage. The competition of the second value of lead ore, would place an element in the field that would correct the present conditions, and put the home plants on their mettle to compete. Enterprise always manifests itself under such conditions, and there is little fear lest the result would be beneficial, and the profits greater from the treatment of larger tonnages.

The sentiment of high protection is undergoing a change in the United States. The growth of its metallurgical industries depends upon an abundant supply of free raw material, particularly in the admission of those commodities so necessary for the treatment of others. British Columbia resources in lead ores have barely been drawn upon, and only await the galvanic touch of capital and expert talent. With that secured, through the necessities of the United States plants and the opportunity for profitable investment, will come an era of prosperity to dormant districts with rich resources that will make of it the richest province in Canada.

GEO. HUSTON.

Sandon, B. C., Aug. 27, 1906.

Electric vs. Air Drills.

Sir—In your issue of Aug. 18 appeared a brief article by Granville E. Palmer on the comparative merits of air and electric rock drills. This subject being of general interest, I will give some results obtained on the property of Liberty Bell Gold Mining Company. By way of preface I would call attention to the fact that the mine workings of this company are all above 10,400 ft. from sea level, and mostly above 11,000 ft. Electric power has been used exclusively, being purchased from a local generating company. Until recently it has been high in price. The vein itself has averaged only about 4 ft. in width, and has not been hard enough to warrant the introduction of the common piston stoping-drills as against hand mining.

The result of these conditions has been that the company has felt the need of power machines for drifting and cross-cutting only. The fact of the presence of electric power in the mine prompted the hope that we might use electric machines, thus securing the advantage of low construction cost as well as the greater saving in operation. The main installation was in the Stilwell cross-cut tunnel. At the end of one year's agony, during which we had tried three of the types of machines then offered, we were forced to abandon the experiment. A good motor-driven air plant, with 3¼-in. auxiliary-valve machines, finished the work effectively and at an ultimate saving in cost, by reason of the absolute regularity of the work.

These results were not such as to build faith in electric machines, but in 1904 our attention was called to the new Temple electric air drill, and the third Temple machine was sent to us for trial. Our opportunities for comparative tests were excellent, as we still had 3¼-in. air machines working at 100 lb. pressure in the country rock of andesitic breccia, and placed the new machine on similar work. Day by day the Temple machines would drill as fast or faster than the other machines. The common shift's work was established at 50 to 60 ft. of hole drilled, loaded and shot by the machine runners in eight to nine hours as against a similar footage drilled, but not loaded or shot, by the men with the standard air machines.

We purchased the machine without question at the end of an extended period of trial and today, after nearly two years' service, it is still at work. It is now in use by contractors on drift work on the vein. That the machine is acceptable to contractors is, in itself, a very strong indorsement.

This machine operates on direct current, and this involves the interpolation of a rotary transformer, which is objectionable. Since its installation we have also bought the first Temple machine to be sent out equipped with a 400-volt, three-phase, alternating-current motor. This machine has two speeds, and since the perfecting of the switch, has given excellent results.

There have been delays in the operation of the machines, but they have been from the fact that, on a machine so new, sufficient information had not been compiled. Of late months these delays have been at a minimum. The cost of repairs has been hardly more than on the standard machines.

The power consumption is 5 h.p. per drill. At our altitude, running only a two-drill compressed-air plant, we found our motor input at the compressor to be 50 h.p. Inasmuch as we buy power on a peak load contract, the difference is obvious.

I trust that my attitude is clear. I desire to supplement Mr. Palmer's comments and not to criticize his conclusions. The saving grace of the standard air drill, as Mr. Palmer says, is its practical indestructibility, and in the Temple drill the clever designer, Robert S. Temple, has improved upon the old form in strength, and at the same time has applied his power economically, a new and very valuable service.

For any man to pose as an advocate of either electric power or air power solely for mining use, seems to me quite futile. Since we have adopted the Temple electric machines for drifting, we have found economy in the introduction of small air hammer machines (Leyner) for stoping and raising. We still find occasional use for the standard air-machine. In the meantime we hoist timber into all stopes with portable electric hoists.

To my mind there is a place for electric drills in many mines, and certainly we have found one drill that can fill the place here. That other drills may have been perfected is possible; but I desire to discuss only what I know, so we will leave the other drills for other men who may know.

CHARLES A. CHASE,
General Superintendent, Liberty Gold Mining Company.

Telluride, Colo, Sept. 8, 1906.

A South African company will develop antimony ores in the Barberton mining district. A shipment of 15 tons to England averaged 55 per cent. antimony, and was transported at a cost of $30.75 per ton.

Slag Granulating and Conveying Device.

BY HIRAM W. HIXON.*

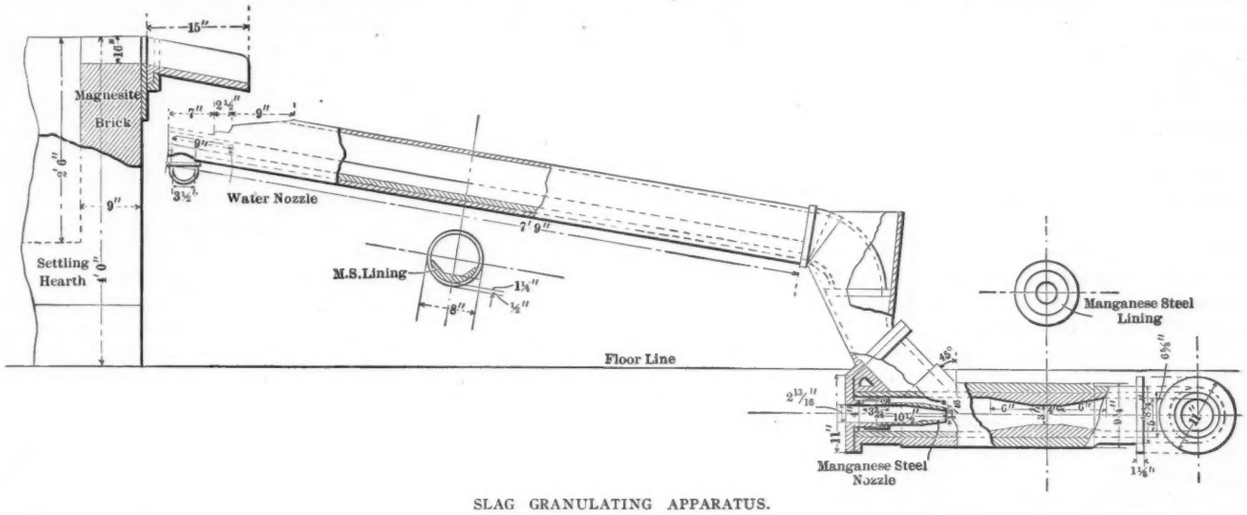
The slag granulating and conveying device which has been in use for five years at the works of the Mond Nickel Company is illustrated in the drawing accompanying this article. The slag is granulated by a stream of water under a head of 20 ft. issuing from a 3½-in. pipe with a nozzle ¾x3⅛ in. The water and slag are discharged into a cast-iron funnel connecting with the upper leg of a cast-iron Y. The lower leg of the Y is connected with a 5-in. water main from a cross-compound duplex pump, capable of supplying 1000 gal. a minute at 150 lb. pressure. The 5-in. main terminates in a manganese-steel nozzle of 1 15/16 in. diameter. The jet from this nozzle strikes the granulated slag and water from the funnel and drives it through the throat of the manganese-steel lining of the Y into the 5-in. cast-iron discharge pipe. The discharge pipe carries the granulated slag and water to the dump, which is built out and the pipe lengthened as required. The discharge pipe may be level or stand at any grade upward or downward, depending upon the local conditions as well as the pressure of the water in the nozzle and the amount of slag to be discharged. In our case the pipe is on a slight grade, viz., 6 in. in 100 ft., to allow for drainage in cold weather if the pump should be stopped.

The pressure on the nozzle will depend upon the amount of slag and water entering the funnel, and the length and diameter of the discharge pipe. If the discharge pipe is too large in diameter it will require more pressure on the nozzle to operate, for the reason that as the velocity of the water is reduced the carrying capacity decreases as the sixth power of the velocity. Thus if the velocity is doubled the carrying capacity is increased as the sixth power of two, or 64 times as much. The experiments which led to the adoption of this method of disposing of slag were started with a centrifugal pump with a manganese-steel lining and impeller.

The small steam engine required to operate the pump could not stand the strain of high speed and constant operation and soon broke down. During the time it was in use we found that when there was slag in the pump that filled up the space between the impeller and the lining, the discharge worked all right, but when the matte was tapped out of the settler and the slag stopped going into the granulator and the pump was free of slag, it would not discharge the water alone and some water overflowed until the slag started again. The explanation of this is that the slag being so much heavier than water, the centrifugal action exerted a greater pressure on the discharge and made it act while filled with slag, but when only water was present the slip was so great that the pressure was not enough. Another feature that finally made scrap of the engine was that when the matte was tapped out of the settler the slag suddenly stopped going into the pump, which then automatically unloaded itself and not having a governor it ran away unless somebody happened to be near enough to shut off the steam.

The first experiments with the present conveyor were made with the use of ordinary 5-in. cast-pipe fittings. After proving that it would work, a special cast Y with the discharge leg longer than the other two was tried. This was made of hard iron, but wore out so much that the throat became too large and back currents were induced to such an extent as to destroy the nozzle and require much more pressure to operate. Manganese-steel nozzles and linings made by Hadfield, of England, were then tried and gave so much better results that now they are used exclusively.

The system does not require any special care and two men on each shift are all that is required to attend a furnace smelting 250 tons in 24 hours. Some attention is necessary to the slag stream, where it strikes the water, but otherwise the system operates without any oversight so long as the throat of the lining is not worn out too large and the pressure of the water supplied by the pump is kept up. Ordinarily 100 lb. pressure at the nozzle will carry the slag 400 ft. from the furnace and discharge a considerable amount of air with it which is drawn in at the funnel. If the size of the dump increases beyond the limits of pressure that the pump can supply, a second Y can be put in at any point along the discharge and coupled up in series without the funnel, when the slag can be thrown out another 500 ft. to the face of the dump. At present the dump is being removed by a steam shovel for railway ballast, so that the second Y is not necessary.



SLAG GRANULATING APPARATUS.

For a small plant where there is plenty of water this is the cheapest method of removing slag, but in cases where water is scarce or where several furnaces are each smelting a large tonnage, trains of large pots pulled by locomotive would prove more satisfactory. So far as I am aware this is the only conveyor of its kind in existence. The same principle is used to sluice out the ashes from the holds of steam ships, but they are intermittent in action and the water jet is supplied by the discharge from a steam injector. The hydraulic elevator used in placer mining uses a jet acting through a vertical pipe to elevate gravel. The wear on the discharge pipe is mainly on the bottom; consequently it is turned over in order to cause the wear to proceed evenly over the interior before the pipe is discarded.

Pure gypsum is white, and so soft that it can be scratched with the finger nail, and when in a crystalline form is translucent. Impurities in gypsum affect its translucency and color, so that the mineral as mined is an opaque, finely crystalline mass, varying in color from white to reddish, gray or brown.

*General manager, Mond Nickel Company, Victoria Mines, Ont., Canada.

Hematite Mining in New York.

BY ROBERT B. BRINSMADE.*

(*Concluded from page* 493.)

Timbering and Scaling—In the incline, so far, nothing but occasional stulls have been put in to sustain the roof; but it is probable that it will be cheapest and safest while under the serpentine hanging to instal three-quarter sets covered with lag poles.

To obviate the danger to the trammers from the continual falling of the roof in the completed stopes, that portion of the drifts under the stopes is roofed with 3-in. round poles supported by 10-in. round stulls from foot to hanging wall and set 6 to 8 ft. apart, as at *L* and *K* (Fig. 3. By keeping the drifts under the pillars arched and low, no stulls are needed there, so as each pillar has a width of 15 to 20 ft. to the 20 or 30 ft. width of its stope, only two-thirds of the drift roof needs protection by timber.

The stulls are of unbarked hemlock or hardwood (spruce being useless underground) at least 10 in. diameter at the small end, and often 30 ft. long. A heavy stull is pulled out of the skip and set on the truck of an ore car, (from which the box has been removed) shoved along the level until under its appropriate place and then dragged up the foot wall and lifted up by a differential chain block to drop finally into its prepared hitches. The hitches were formerly beaten out by hand with a moil, but this tedious work on the tough lime footwall has been hastened by substituting for the moil a 2¼ in. air drill on a tripod.

When not supported by a stull, the serpentine hanging wall must be removed up to a slickenslide, or parting plane, of an area large enough to span the unsupported opening. Hence to keep a working place safe until the ore is removed, much serpentine is barred down on the day shift by the two scalers and hoisted to the surface, the use of a skip making it inconvenient to store the waste in the worked-out stopes above, and there is no space for storage in the working level. Most of the roof scales come down by driving in moils and wedges, but, to dislodge a heavy piece, a hand or machine hole and a little powder are often necessary. In the upper workings of the Caledonia and a large portion of the Clark mine, the ore lay under sandstone instead of serpentine, the roof was solid and the expensive scaling was not required.

Tramming—There are no regular ore chutes or "gates," as only one stope on a level is worked at a time, as at *F*, *D* and *B*, Fig. 3; but as the footwall is frequently so flat that the ore will not slide down to the tram car from the face, timber ore flumes are utilized. Each flume section is 20 in. wide inside by 8 in. high, has a length of 12 ft. and is formed from four 2x10-in. hemlock planks; it has a drilled iron strip at each end, through which it can be bolted to a like section above and below. The whole flume can then be hung from a peg in the footwall at any desired place and have its lower end resting on the empty car in the level below, so that a line of muckers can rapidly shovel the ore down.

The tram car has four 9-in. loose cast-iron wheels and a wooden truck surmounted by a 5/16-in. steel box, open at the front end, which is 5 ft. 6 in. long by 28 in. square, and turns on a king bolt and hinge to dump in any direction from the track.

The car is run down from the face on a track of 1-per cent. grade, with 33-in. gage, and 30-lb. rails. The tram track passes over the incline from one side to the other, to allow the box (turned at right angles to the truck), to dump directly into the skip running beneath.

Hoisting—The skip box is of ⅜-in. steel, 8 ft. long, 34 in. wide and 30 in. high, and holds, as usually loaded, two scant tram cars, or 1.5 tons, of shipping ore. The mucker boss dumps the cars into the skip with the help of two muckers, who have waited at the incline with their load for that purpose. The signals are whistles, given through a 1-in. iron pipe running up the ladderway to the engine room. They are: 1, stop; 2, hoist; 3, lower; 4, hoist slow; 5, lower slow; 6, air or steam off; 7, air or steam on. Recently an underground telephone (single insulated-wire system with each instrument grounded) has been installed, communicating with the surface receivers at office, engine room and shops, and this has greatly expedited operations, as it is against the rules for men to ride in the skip.

The skip dumps at the surface against a bumping block by allowing the front wheels to run on a horizontal track, while the rollers, on the ends of the rear axle, catch a sloping track of sufficient gage to pass the front wheels, the bale pins being attached behind the box's center. The incline's track is in line horizontally, but varies in grade, so that bearing rollers both in roof and floor are requisite. The latter are 6 in. diameter maple, with 1-in. iron axles, while the former are 15 in. diameter, cylinders of boiler plate on cast-iron spiders with axles running in boxes, that are set in a timber frame overhead.

The speed of a round trip to the top from the 600-ft. level is about 4 min. The skip is pulled by a 1-in. cast-steel rope by a second-motion duplex 12x18-in. hoisting engine, with Stevenson reversing links, spur gear and a single wooden-lagged drum of 5 ft. length by 6 ft. diameter.

At the Sterling mine the shaft has two one-ton skips, wound up in opposite directions on the single drum of a 12x24-in. second-motion engine with one steam cylinder and reversing link. The valve is fitted with the Meyer cut-off, but it is thrown out of gear, as it never worked well.

Pumping—Besides the pumping already described for shaft sinking, the water from the pump at the 600-ft. level is thrown by a No. 6 Cameron (run by air) to a large reservoir on the 350-ft. level, from which a No. 9 Cameron throws it at intervals to the surface. The latter pump is moved by steam, brought down the incline from the boilers (some 700 ft. distant) in a 2-in. pipe, which pipe is enclosed in square boxing of four 1x8-in. or 1x10-in. boards, filled with sawdust. The same boxing has been adopted to enclose the 1½-in. steam pipe along the surface (carrying steam to work the No. 6 Cameron pump that raises soft water from a creek to the boilers about 1200 ft. away) and has rendered the condensation small, even in the semi-arctic winter of this locality. In zero weather, the 3-in. surface pipe carrying the water from the creek to the boiler also gave constant trouble from freezing until the pipe (where not under the snow) was wrapped with paper and was warmed by blowing in steam just before and just after pumping water.

Lighting—The light is solely by miner's oil lamps, except in raises, where candles save the men from the disagreeable oil smoke. Paraffin wax lamps were tried; but the higher cost, and extra care required to keep them alight in the temperatures (less than 60 deg. F.) prevailing in this mine, caused their rejection. The Sterling mine is lit, above and below ground, by electricity. In the stopes, the incandescent lamp clusters are hooked up to a timber and removed to a safe place just before blasting.

Compressed Air—The air compressor is single stage straight-line McKiernan of 24 in. diam. steam cylinder, 22 in. diam. air cylinder, and 30-in. stroke, running up to 90 r.p.m.; it is fitted with the Meyer cut off, which has no governor, and must be regulated by hand. The air is kept at 60 lb. which will do the work and is more economical for single-stage compression than a higher pressure. A four-drill straight-line Morris County Iron Works compressor is held in reserve. Cooling water for the air cylinder jackets of both compressors, is circulated from a cistern under the engine room by a 4½ Blake pump.

The air goes down the incline through a 3½-in. wrought iron pipe, from which the 2½-in. main leading into each working level can be shut off by a 2½-in. iron body gate valve. On the end of the level-main, at a safe distance from the working face, is screwed a 2½-in. branch tee, with three 1¼-in., and one 2½-in. openings, from which a 1-in. pipe goes off to each drill,

*Professor of mining, New Mexico State School of Mines, Socorro, N. M.

shut off by a 1¼-in. handle-cock at the branch tee. The air hose, in 25- or 50-ft. lengths, is of unwrapped six-ply rubber; it is 1¼ in. diameter, the idea being to preserve from the level-main a minimum section of 1 in. diameter through 1¼-in. cock, 1¼-in. hose (which is choked on mending to 1 in. inside by the insertion of a 1-in. nipple) and 1¼-in. handle cock to the drill's valve chest.

Tool Sharpening—The blacksmith shop has two forges, a drill press and a power-hammer made from a 2½-in. air drill. On each shift are a tool sharpener and helper, with a repair blacksmith and helper on day shift besides. Each rock drill uses from 10 to 15 bits per shift, which are in sets as follows:

Name.	Length.	Width. (Cutting edge.)	Shape.
Starter	2' 6"	2¾"	1¾" star alone.
2d.	4' 6"	2⅜"	{1⅜" star bit; 1¼" octagon shank.
3d.	6' 6"	1⅞"	1¼" octagon shank.
4th.	8' 6"	1⅝"	1¼" octagon shank.
5th.	10' 6"	1½"	1¼" octagon alone.

The starters are of Vulcan star steel swaged down at one end for the shank. The fifths are of Vulcan octagon steel. The seconds, thirds and fourths have each a star steel bit, 18 in. long, split at one end for welding to the wedge-shaped end of the octagon steel shank. The bits are draw-tempered to a brown color with great care to withstand the hardness of the specular ore. The picks are double pointed, of solid cast steel, and are given a plunge temper.

Ore Sorting—In the daytime the skip dumps on the head-frame (Fig. 4) into a flat dock-car, which has a wooden box 8x4 ft. by 10 in. high, open at each end. The box dumps in any direction from a wooden truck, set on a track of 30-lb. rails, 3-ft. gage, running about 16 ft. vertically above the ore-dock floor. Two top men here throw away any large pieces of waste into a car alongside, and the remainder is then dumped over a shoot into another dock-car on the ore-dock floor below, where the ore is broken up and the remainder of the waste picked out by two sorters. When the dock-car has on it three or four tons of shipping ore, it is wheeled to the dock side and dumped into one of the railroad cars alongside. At night the skip dumps directly upon the dock floor and the resultant pile is next morning broken up and shoveled into a dock-car, the waste being thrown off by a sorter standing on the car. When full, this car is dumped into a railroad car for shipment.

The stock pile which accumulates on the dock during the winter months (when snow and ice blockade the railroad switch, or there is danger that the ore will arrive at the furnace so frozen in its open cars as to require blasting before unloading) is handled in the spring, like the night shift ore. Five shovelers on the dock, one sorter standing on the dock-car and two sorters in the railroad cars, for every three dock-cars, are the gang hired for shipping the stock pile. The cost for 120 long tons shipped per day is as follows: 15 shovellers at $1.50, $25; 3 dock-car sorters at $1.50, $4.50; 2 railroad car sorters at $1.60, $3.20; 1 dock boss at $2; 1 water boy, 60c.; total labor, $32.20; or per ton, 27c.

To reduce this high labor cost, it is planned, when shipping, to catch the night hoist on dock-cars, which can be partially sorted over then and the remaining waste removed by daylight next morning by the sorters on the railroad cars.

During the winter nothing but sorted ore will be put on the stock pile, so that it can be quickly loaded for shipment in the spring by a small steam shovel. A jaw crusher may also be put in; for although the red hematite offers no difficulties, the specular ore is rather expensive to break up, by hand sledging, to the cocoanut size desired at the furnace. Except a few cars shipped to metallic paint grinders, the present output goes to the blast furnaces at Wharton, N. J.

At the Clark (Figs. 5 and 6) and the Sterling inclines, the ore falls from the mine skip into a small car (set on a trestle over the railroad switch) which dumps directly into the railroad car. There, two sorters can pick out the waste from 50 tons of ore of 42 per cent. grade in iron, per shift. At night, sorting continues by electric arc lights, only the cleaner ore being hoisted at this time.

Labor—At the Caledonia mine for a shipment of 120 long tons in two shifts, it takes a hoist of 160 to 180 tons of crude ore, and the following force of men: mine foreman, $3; 2 shift bosses at $2.25, $4.50; 2 scalers at $2 and $1.75, $3.75; 14 drill runners at $1.75, $24.50; 14 drill helpers at $1.60, $22.40; 1 mucker boss, $1.80; 20 muckers at $1.60, $32.00; 1 head blacksmith, $2; 2 blacksmiths at $1.60, $3.20; 3 assistant blacksmiths at $1.50, $4.50; 1 head carpenter $2.75; 2 carpenters at $1.60, $3.20; 1 pumpman, $2; 2 engineers at $2.33, $4.65; 2 firemen at $1.75, $3.50; 1 coal passer, $1.45; 1 teamster, $1.40; total for 120 tons, $120.60; or, per ton, $1.005.

The bosses and mechanics are Americans; the drillmen and muckers are Austrians; the dock-sorters are Americans, while the shovelers are mostly from Naples. There is no labor union, and were it not for the pay day and holiday drunks, affairs would run smoothly. The taking by the Austrians of about 20 to 40 extra holidays a year, for the feasts of their saints, interferes very much with the regular production in a mine in which they are the chief reliance.

The day shift for five days of the week is from 7 a.m. to 5.30 p.m., with an hour for nooning; the night shift is from 7 p.m. to 5:30 a.m., with half an hour for luncheon. On Saturdays, the day shift is from 7 a.m. to 4 p.m., with a noon hour; and the night shift from 4 to 9 p.m., without intermission. In addition there is an extra shift from Sunday at 12, midnight, to 7 a.m. Monday. The men come up for the day, but most stay underground for the night intermission. The timekeeper takes the men's time on their entrance to the mine, and each shift boss has also his own time book as a check. The time is posted every day on a bulletin at the office where the men can inspect it and rectify mistakes before the results are finally entered on the pay-roll ledger.

Office Work—A supply book is kept in which is noted the receipt of such supplies as coal, explosives and oil, and their daily consumption, as taken from the tally boards of the consuming departments. The Rossie Supply Company, a sister company, conducts a general store for the employees, and also keeps in stock many articles for mine use. A cost book records the monthly costs, and a shipment book, the movement of freight. There are about two dozen wooden cottages on the property, built 20 or 30 years ago, which are rented to employees at $2 to $4 per month. The men are paid in cash, twice a month, the balance due them, after deducting rent, board and store bills.

Costs—The following are the items of a cost sheet for a recent half-year, during which 14,500 long tons of ore were mined and shipped. The costs of new construction are above the normal as is also the item of mine labor, as half the period was with 8-hour shifts, when the mine was not arranged to make them efficient.

	Total.	Per ton ore.
Coal	$3,200.00	$0.221
Dynamite	1,600.00	0.110
Oil	520.00	0.036
Timber	805.00	0.055
Tools and supplies	3,500.00	0.242
Surface labor	4,918.38	0.340
Mine labor	14,593.75	1.000
Mechanical labor	4,000.00	0.275
General expenses	2,700.00	0.186
Gross	$35,837.43	$2.465
House rents	580.00	0.039
Net	$35,257.43	$2.425

Adding to this the freight rate (to Wharton, N. J.) of $1.50, the total cost of the ore delivered becomes $3.92 per ton, which is almost prohibitive. The factors which cause this high cost are: First, the low grade of the footwall, making several re-handlings necessary for much of the broken ore from stope to tram car; secondly, the treacherous serpentine hanging-wall, care for which means much extra hoisting, timbering and scaling, and which has given the mine such a reputation for danger that few good miners of the region care to work in it; and thirdly, the irregularity of the orebodies, which makes systematic working on a large scale impracticable.

The cost factors which can be lowered are: First, power, by development of the rapids of the Oswegatchie river, about three miles distant; secondly, the cost of ore handling and sorting on the dock, along lines already suggested; and thirdly,

the increase of the output to the maximum allowed by the orebodies.

By these means it is possible that the total cost of the ore could be reduced to $1.50 per ton, provided the orebodies do not take a turn for the worse. Even at this figure these mines may have difficulty in meeting the competition in the seaboard market of the higher-grade Cuban and Lake Superior ores, except when the demand for ore is brisk and prices good.

The Mashek Briquetting Process.

The Traylor Engineering Company, of New York, which has recently begun the manufacture of fuel briquetting machinery, and the installation of plants under the Mashek system, has already received several important orders. Three of these orders are, respectively, for Edward B. Arnold, No. 1 Broadway, New York, for his plant at the foot of West 48th street, New York; the Semet-Solvay Company, for its Detroit plant; and the Montreal Light, Heat and Power Company, of Montreal, Canada.

These plants represent three interesting variations of the briquetting industry. Mr. Arnold is a large coal dealer. His plant is to make briquets for domestic consumption, using the small sizes of anthracite coal. The Semet-Solvay Company will make first-class fuel for domestic use from the coke breeze, which is a waste product from the Solvay by-product coking ovens, and the Montreal Light, Heat and Power Company will make a smokeless briquet for family use from coke breeze resulting from gas making, using coal-tar pitch as a binder.

The adoption of the Mashek process by these three concerns is of particular significance because each of them has been experimenting for a long time with European briquetting machinery and machinery of other designs. The Mashek plants are entirely automatic. The briquets are of a size and shape suitable for immediate use and convenient to handle by chute or shovel and the production per hour is large. The briquets are hard and clean and are comparable with the best qualities of anthracite. The cost of briquetting under this system has been demonstrated in plants now in operation to be from 76c. to 92c. per ton, including pitch for binder, and everything but the cost of the raw material to be briquetted. The system operates equally well on anthracite or bituminous coal, coke breeze or lignite. The design of the machinery and the installation of plants is under the personal supervision of G. J. Mashek, the inventor of the process.

Copper Lead and Zinc Mining In Rhodesia.

According to a recent interview in the *Cape Times*, great developments are going on in northern Rhodesia. Following on important discoveries of mineral, the Cape to Cairo Railway has been pushed forward with the greatest energy. The river Kafue, one of the great feeders of the Zambesi, has been spanned by a bridge 1400 ft. long, and the railroad is now at Broken Hill, 130 miles farther north. The three mining companies which have the chief interest in the district are the Rhodesia Copper Company, the Northern Copper Company, and the Broken Hill Development Company.

The Broken Hill mining field consists of a number of kopjes which have only to be quarried for the zinc and lead ore which they contain. The first trial shipment of zinc ore was recently despatched from Beira to Swansea, Wales. The zinc ore is calcined on the spot. The calcined ore assays 50 or 60 per cent. zinc. The cost of mining and sending the ore to Wales, including all charges, is about $19.47 a ton. The lead ore will be smelted on the spot; this ore also is rich.

Railway surveys are being made to Bwana M'Kuba, about 100 miles north of Broken Hill. Mines there are rich in copper. The old workings by the natives extend 2500 ft. in length, and go down 100 ft. They show two reefs, one 12 ft. and the other 8 ft. wide, with a space of 30 ft. between them. The two reefs come together and form a body of ore 12 to 15 ft. in thickness. The reefs have been proved to a depth of 280 ft., and the copper averages 15 per cent.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Published Week Ended Sept. 11, 1906.

830,513. BLAST-FURNACE.—Maxmilian Mannaberg, Frodingham, England, assignor to Frodingham Iron and Steel Company, Limited, Frodingham, England. Filed Jan. 20, 1906.

830,536. METHOD OF MAKING CAST-IRON ARTICLES — Alexander W. Slocum, Pittsburg, Pa., assignor of one-half to Charles V. Slocum, Pittsburg, Pa. Filed Feb. 12, 1903.

830,538. PNEUMATIC VANNER.—Albert H. Stebbins, Little Rock, Ark. Filed Aug. 19, 1904.

830,564. TRAMWAY-BUCKET GRIP.—Edward A. Brown, St. Louis, Mo., asignor to Joseph D. Bascom, St. Louis, Mo. Filed Jan. 9, 1905.

830,586. COAL-CUTTING MACHINE.—Abram S. Hamilton, Nanaimo, British Columbia, Canada. Filed Aug. 18, 1905.

830,591. GRATE FOR GAS-PRODUCERS.—Robert Hilprecht, Lansing, Mich., assignor to American Suction Gas Producer Company, Lansing, Mich. Filed June 26, 1905.

830,615. APPARATUS FOR CYANIDING ORES.—Thomas L. Rankin, Sackett Harbor, N. Y. Filed June 11, 1906.

830,697. COAL CUTTING OR WINNING MACHINE.—William Young, William Clark, and Henry Green, Bickershaw, England, assignors of one-fourth to Charles Fitzhenry Bouchier, Hindley, England. Filed Oct. 20, 1905.

830,709. MACHINE FOR ATTACHING SLATS TO CONVEYER-BELTS.—Walter T. Gordon, Juniper, Oreg. Filed Jan. 25, 1905.

830,730. MEANS FOR SURVEYING BORE-HOLES.—Hugh F. Marriott, Parktown, Transvaal. Filed Aug. 30, 1904.

830,738. METHOD OF MELTING AND CASTING SILICON.—Henry N. Potter, New Rochelle, N. Y., assignor to Geo. Westinghouse, Pittsburg, Pa. Filed Apr. 21, 1905.

830,744. ROCK DRILL.—Charles H. Shaw, Denver, Colo. Sept. 21, 1905.

830,798. COMPOSITION FOR BRIQUETTING COAL AND THE LIKE.—Herbert L. Mitchell, London, and George W. Goode, Heath Grange, South Godstone, England, assignors to William Henry Armstrong Fitz Patrick, Cragside, England. Filed March 2, 1905.

830,802. MINING-HARNESS.—John Poehlman, Springfield, Ill. Filed Nov. 25, 1905.

830,836. ORE-HOIST.—Charles W. Hunt, West New Brighton, N. Y. Filed June 20, 1906.

830,841. COKE-QUENCHING APPARATUS.—Ernest F. Lloyd, Detroit, Mich. Filed Nov. 14, 1904.

830,872. AMALGAM CARRIER AND PLUGGER.—Hugh W. Arthur, Pittsburg, Pa. Filed Jan. 11, 1906.

830,904. FURNACE FOR ROASTING, CHLORIDIZING, OR DRYING ORES.—Arthur V. Leggo, Pendeen, Victoria, Australia. Filed Oct. 21, 1905.

830,948. BURNING TIME-FUSE.—Karl Wieser, Essen-Rüttenscheid, Geramny, assignor to Fried. Krupp Aktiengesellschaft, Essen-on-the-Ruhr, Germany. Filed Dec. 1, 1905.

830,958. FURNACE-CHARGING MECHANISM.—David Baker, Philadelphia, Pa. Filed Mar. 23, 1906.

830,968. GAS-PRODUCER.—Grant Campion and Mott Wyant, Anderson, Ind. Filed June 22, 1905.

830,983. PROCESS OF TREATING COAL-GAS FOR EXTRACTING TAR, WATER, AND AMMONIA.—Walther Feld, Hoenningen-on-the-Rhine, Germany. Filed Jan. 4, 1906.

830,989. COAL-WASHING JIG.—William B. Gillon and John M. Ricketts, Sopris, Colo. Filed Mar. 20, 1906.

831,007. CONCENTRATING-TABLE.—John G. Kirksey, Carthage, Mo. Filed Mar. 6, 1905.

831,010. PROCESS OF TREATING SCRAP-BRASS—Henry J. Krebs, Wilmington, Del. Original application filed Dec. 5, 1905, Serial No. 290,412. Divided and this application filed Mar. 27, 1906.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended Sept. 1, 1906.

15,423 of 1905. STEEL PROCESS—J. Churchward, New York. In making steel castings, especially armor plate, using about ½ per cent. each of nickel chromium and manganese and using a mold having a manganese surface

15,757 of 1905. ROCK DRILL—H. Hellman and L. C. Bayles, Johannesburg, S. A. A small, compressed-air rock drill with all the operating parts inclosed.

16,374 of 1905. METALLURGICAL PROCESS—G. E. Kingsley, Toronto, Canada. A process for treating sulphide ores containing lead by extracting the lead as nitrate by lixiviating with nitric acid not above 70° B.

21,009 of 1905. MINERS' LAMP—E. A. Hailwood, Morley, Yorkshire. Improvements in electrically igniting miners' lamps so that there is no chance of a spark forming outside.

24,226 of 1905. CHEMICAL PROCESS—W. N. Bacon, London. The formation of a soluble crystalline monosilicate of soda.

968 of 1906. COKE MANUFACTURE—W. Wielandt, Berlin, Germany. A process for making coke from peat, lignite, etc.

2375 of 1906. MINERS' LAMP—E. A. Hallwood, Morley, Yorkshire. Improvements in miners' safety lamps, chiefly details of construction.

9126 of 1906. MINE PROP—P. Mommertz, Marxloh, Germany. Improved telescopic mining prop that can be securely clamped for any length.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURAL informed of their movements and appointments.

A. Chester Beatty has arrived at Salt Lake from Alaska.

J. A. Ede, of Lasalle, Ill., was a recent visitor in New York.

R. J. Frecheville recently passed through San Francisco on his way to London from Japan.

W. C. West is manager for the Black Peak Gold Mining Company at Hillsboro, New Mexico.

Joseph Irving is superintendent of the Continental Smelting and Refining Company, Ironton, Colo.

T. J. Drummond, of the Lake Superior Corporation executive, has gone to Vancouver, British Columbia.

Joseph Luxon has resigned the superintendency of the Cyrus Noble Mining Company at Searchlight, Nevada.

W. H. Whiteside was unanimously reelected president of the Allis-Chalmers Company at its last meeting, Sept. 6.

E. E. Connery, of Minneapolis, Minn., and C. H. Resler, of St. Louis, are at Tuscarora, Nev., installing a Resler mill.

Neil Cochrane, recently in British Columbia, is now manager of the Jumper mine in Tuolumne county, California.

W. T. R. Cowell, manager of the Barranca de Cobre mines, has returned to Chihuahua, Mexico, from New York.

G. W. Huddleston, of New York, is in Germany in the interest of the Continental Mines Company, of Vulcan, Colorado.

H. Otto Hanke, a director of the Daly Judge Mining Company, operating at Park City, Utah, has been west on an inspection trip.

A. H. Wethey, manager of the Clark mines and smelter, has returned to Butte, Mont., from a business trip to Boston and New York.

Thomas J. Heney, of Spokane, has been appointed foreman of the Tamarack & Chesapeake mine, in the Tiger Peak district of Idaho.

Professor F. O. Doeltz, of the Bergakademie, at Clausthal, in the Harz, has been appointed to the chair of metallurgy at the Berlin Technical School.

James W. Neill, of Pasadena, Cal., consulting engineer for the East Butte Company, is in Butte, Mont., on business connected with the company.

C. F. Burnham and D. C. Tobin, of Vulcan, Colo., visited Silver Plume, Colo., recently to examine the Crane ore washer at the Dives-Pelican mill.

L. W. Powell, general manager of the Calumet & Arizona associated mines at Bisbee, Arizona, will be at Duluth for some time, beginning this week.

John C. Adams, superintendent of mines for the Boston & Montana Company, is back in Butte, Mont., after an absence of six weeks spent in New England.

E. C. Knight, manager of the Monterey, Mex., plant of the American Smelting and Refining Company, has been inspecting the plants of that corporation in Utah.

W. H. Shockley, of Tonopah, Nev., a well known engineer at one time in the employ of the British Government, spent a few days in Butte, Mont., recently.

R. M. Atwater, of Helena, Mont., has been in Duluth the past week on business, and is now on his way to Bolivia, where he will be for several months.

Arthur Houle, formerly smelter superintendent for the Calumet & Arizona Mining Company, and lately at Tucson, Ariz., is visiting his parents at Negaunee, Michigan.

A. S. Dwight, formerly general manager of the Greene Company's Cananea plant, is in Tezuitlan, Puebla, Mex., in the interests of Robert S. Towne of New York.

Sidney H. Wilcox has gone to Curacao, Dutch West Indies, to take charge of a phosphate property that is to be developed on that island by the Santa Barbara Corporation.

George D. Harrington, of New York, has gone to Denver, Colo., and will take a position with the J. George Leyner Engineering Works Company, as general agent for Mexico.

J. F. Caldwell, manager and principal owner of the Sultana gold mine, Lake of the Woods district, Ontario, has gone to England with a view of interesting British capitalists in the enterprise.

Dryden Smith, late manager of the Laurentian gold mine in the Lake Manitou region, Ontario, has been appointed general superintendent of the Little Master property in the same district.

Anthony J. McMillan, general manager of Le Roi Mining Company, will leave Rossland, B. C., before the end of September for London, England, to attend the annual meeting of shareholders.

Herbert Carmichael, assistant provincial mineralogist for British Columbia, last month visited the Big Interior group of mineral claims in the Great Central lake district of Vancouver Island.

Milnor Roberts, dean of the school of mines at Washington State University, has returned to Seattle, Wash., from examining copper properties at Prince William sound, Alaska, for eastern owners.

L. P. Gratacap, curator of the mineralogical collections, Museum of Natural History, New York, has returned from Iceland, where he has been spending the past summer, engaged in scientific investigation.

T. E. Schwarz has just returned to Denver from some professional work in the Gunnison section, Colorado, and leaves next week for Leadville, where he is consulting engineer to the Iron-Silver Mining Company.

R. D. Fetherstonhaugh has retired from the management of the hydraulic gold property at Atlin, British Columbia, owned by the Northern Mines, Ltd., of Vancouver, B. C. H. B. Warren is now in charge of operations.

Donald G. Forbes, who lately returned to Victoria, B. C., from making an examination of the Similkameen Mining Company's mining property at Bear creek, Similkameeen, has gone to Cariboo on similar business.

Paul Johnson, manager of the Alaska Smelting and Refining Company's smelting works at Hadley, Prince of Wales island, was in Seattle, Wash., the last week in August and returned to Alaska early in September.

Wm. B. Phillips has completed his work at Terlingua, Texas, the quicksilver mines of the Chisos Mining Company being now in good working condition and its furnaces running smoothly. Dr. Phillips has returned to his headquarters at Birmingham, Alabama.

George Williams, of Greenwood, British Columbia, has resigned as construction engineer and assistant superintendent at the British Columbia Copper Company's smelting works, after three years' service with that company. His resignation will take effect on Oct. 1 next.

W. L. Austin, of New York, recently visited the Boundary district of British Columbia and again examined the Granby Company's mines. He made an examination of these properties in the spring of 1904, on his last visit to that district. He left Phoenix, B. C., Sept. 3, for California.

W. L. Williamson, of Muncy, Penn., who has recently been in Missouri examining iron, lead and zinc properties, has been appointed superintendent of mines for the Franklin Iron Manufacturing Company, at Clinton, N. Y., and will immediately assume charge of the position.

G. A. and H. S. Denny, for many years connected with the Witwatersrand goldmining industry, in the technical development of which they have been among the most distinguished leaders, have opened offices in London at Salisbury House, as Denny Brothers, consulting mining engineers and metallurgists.

Dr. E. Naumann has resigned his place as manager of the Zentrale für Bergwesen, of Frankfurt-am-Main, and H. Blumenau, Otto Schwalbach, and Dr. R. Passow have been appointed joint managers. The services of Professor Klockmann, Professor Schwemann and H. H. Oehmichen, as technical advisers, have also been secured.

Henry Stern, of New York, who succeeded the late George H. Robinson as president and managing director of the Britannia Copper Syndicate and allied mining and smelting companies operating

in British Columbia and southeast Alaska, has lately made a tour of inspection of the several mines and the smelter of those companies.

A. Chester Beatty, assistant general manager and consulting engineer of the Guggenheim Exploration Company, after accompanying the Guggenheim party on its recent visit to British Columbia and Yukon Territory, went to Bullion, Cariboo district, B. C., with John B. Hobson, manager of the two Guggenheim companies which a few months ago acquired possession of valuable placer gold properties in that district.

Obituary.

Daniel O'Day, for many years prominent in the management of the Standard Oil Company, died in Rouen, France, Sept. 13, aged 62 pears. He was born in Ireland, and came to this country when a boy. In the early days of the oil industry in Pennsylvania, he became prominent in the transportation of oil from the wells. He was for a time with the Erie railroad, but later became associated with John D. Rockefeller, and had charge of the first pipe line built by the Standard Oil Company. For nearly 30 years past he had charge of the transportation branch of that company, and of its rates and contracts with railroad companies. He was an officer and director in many of the subordinate companies of the Standard.

Camille Mercarder, assistant to the president of the Carnegie Steel Company, died Sept. 7 at St. Joseph's Hospital, Philadelphia, of an operation to remove a blood clot from the brain. He had been ill for about three months. Mr. Mercarder was a native of Hungary, and about 45 years old. He received a thorough technical education in German engineering schools, and was considered a brilliant engineer. He came to the United States in 1899, and for a short time engaged in the bridge business in Chicago. When he removed to Pittsburg he was made assistant to Charles M. Schwab, and during his connection with the Carnegie Steel Company he invented a number of labor-saving devices used in plate and structural mills, and had much to do with the development of the steel forged car axle. He was a member of the German Technical Society of Western Pennsylvania, the Engineers' Society of Wetsern Pennsylvania, the Iron and Steel Institute of Great Britain and the Union Club of Pittsburg.

John Bowron, for 25 years gold commissioner of Cariboo district, British Columbia, died at Victoria, B. C., Sept. 6, in his 69th year. Though not a professional mining man, he was more intimately associated with the history of Cariboo, probably, than anyone else, having taken an active part in its affairs from the time of his arrival at Quesnel in 1862. As the most productive years of the district were 1860 to 1868, inclusive, he shared its fortunes in the hight of its prosperity. From 1866 to 1876 he was postmaster at Barkerville, the chief town of Cariboo. He was appointed mining recorder in 1872, provincial Government agent in 1875, and gold commissioner in 1881. He resigned the two last named positions on May 1, 1905, after having been seriously ill in Victoria for several months. He afterward recovered sufficiently to go about for a time, but of late he failed fast. Mr. Bowron was born at Huntingdon, Quebec, After leaving school he studied law at Hudson, Wisconsin; but later the news of rich gold yields in Cariboo tempted him to join a large overland party going to the goldfields. He married in 1869 a Miss Edwards, of Detroit, who died in 1895. In the death of John Bowron, Cariboo has lost one of its best friends, for his annual report on the district has for years been a prominent feature in the "Annual Report" of the Minister of Mines for British Columbia.

Societies and Technical Schools.

Kingston School of Mining—F. O. Willhoft, of New York, a graduate of Columbia University, has been appointed assistant professor of mechanical engineering at this school, at Kingston, Ontario.

Industrial.

The Chicago Pneumatic Tool Company reports the month of August as the heaviest in the history of the organization, both in business booked and shipments made, the latter exceeding all previous monthly records by 15 per cent.

The Hewitt Machinery Company, San Francisco, is now fully equipped, being agent for the Blaisdell air compressors, in all types and sizes, Jeffrey "Badger" rock drills, Shaw Eclipse air-hammer rock drills and drill sharpeners, Chalmers and Williams general mill and mining machinery, stamp mills, Huntington mills, Frue vanners, ore feeders, Kilbourne & Jacobs' ore cars, skips and cages, and a good supply of steam and electric hoists, water wheels, boiler-makers' tools, small power hammers, pneumatic tools, forged pipe flanges, manhole crabs, boiler hangers and lugs.

The Reliance Reynolds-Corliss engine, marketed by the Allis-Chalmers Company, was designed primarily for driving electrical and other fast-running machinery. Nearly one-half of all the Reliance engines thus far installed have been designed for direct connection to electric generators. The line covers direct-current machines of from 50 to 400 kw., and alternating-current machines of from 150 to 400 kw. capacity. These units have been thoroughly tested in regular and continuous operation with uniformly good results. The speeds at which they run, while somewhat higher than usual in Corliss engine practice, are within reasonable limits and have been demonstrated to be perfectly safe and practicable.

Trade Catalogs.

Receipt is acknowledged of the following catalogs and circulars.

Marshall Wells Hardware Company, Duluth, Minn. *The Zenith*, August, 1906; pages 96, illustrated; paper 6x8 in.

Geo. H. Gibson, New York City. *Manufacturing*, with which is combined Machine Tool List; July, 1906; pages 141, illustrated; paper 4x10 in.

Manhattan Rubber Manufacturing Company, Passaic, N. J. General catalog of Mechanical Rubber Goods; pages 147, illustrated; paper 5x7 in., 1906.

Construction News.

Imperial, Utah—The Imperial Mining Company, which has headquarters in Salt Lake City, has placed an order for power equipment.

Park City, Utah—The Nelson Queen Consolidated Mining Company will soon place an order for a new hoisting plant. Warren C. Wilkins, of Park City, is president.

Greenwood, British Columbia—Included in the new plant and equipment the British Columbia Copper Company, Ltd., of New York, is installing at its smelting works, Greenwood, Boundary district of British Columbia, are five 25-ton carrying bowls or pots for dumping the slag hot. These cars are standard railway gage, equipped with air brakes, etc., and two of them have already made the trip from the manufactory in New Jersey to Greenwood, a distance of nearly 3000 miles, on their own wheels. On each car is an electric motor for operating the worm gear for tilting the pot and dumping its molten contents. Two 15-ton Baldwin-Westinghouse electric locomotives, for hauling the slag cars, have also been received at the Greenwood smelting works.

Kaslo, British Columbia—What will practically be a new concentrating mill is being prepared for operation on the south fork of Kaslo creek, in the Ainsworth mining division of British Columbia. The mill built by the Kaslo-Montezuma Mining and Milling Company in 1897 was dismantled years ago, and the aërial tramway connecting mine and mill was nearly destroyed by snowslides. The mill building is being repaired preparatory to installing modern concentrating plant to have a capacity of 100 tons of crude ore per diem. Tramways will be built to connect the Montezuma and Province mines with the mill, and a wagon road constructed over which to haul the silver, lead and zinc concentrates the 2½ miles to the Kaslo & Slocan Railway for shipment thence to the smelters.

Special Correspondence.

San Francisco. Sept. 12.

There is a scarcity of skilled miners in most of the camps of California, as many of the men formerly engaged in that occupation have come to San Francisco, where higher wages are being obtained in almost all branches of industry. It is not only quartz miners who are scarce but hydraulic and drift miners as well. In the higher mountain counties, such as Plumas, Lassen, Trinity, Siskiyou, etc., this is now causing some uneasiness, as men going in now are expected to stay the entire winter in the larger properties. Inducements are offered in the best going wages, comfortable quarters and "grub by white cooks," but all this fails to bring the requisite number of skilled miners. Even in the more accessible counties, near railroad transportation, there is a shortage of men to work in the mines.

The Stanislaus county people are afraid that dredging is going to hurt the Tuolumne river. The San Francisco syndicate which has acquired a large area of land along the Tuolumne river, above and below La Grange, for dredge-mining purposes, is excavating for an electric light and power line preliminary to the construction of a dredger and active operations. A recent report of the State mining bureau reveals that the prospecting operations on these lands show gold contents of from 28 to 32c. per cu.yd. It is proposed to require the new company to landlock its dredges and also to require it to lay aside the top soil and earth and use it to cover the gravel or rock dug up by the dredge, so as to leave the surface the same as it was originally. This would not only necessitate a double handling of all the earth, but is impracticable under the present system of dredging. The fact is that it is not the river bed but the bottom lands which are usually dredged, so there is seldom any pollution of the river. The mining company in question has acquired the water rights and old hydraulic mining properties of the La Grange Ditch and Hydraulic Mining Company.

The Greenwater copper camp in the Furnace creek region of Death valley, Inyo county, is the center of attraction just at present. It is no place for a poor man, as provisions and water are both high in price, though on the other hand any prospects which are found may be readily sold. There seems no difficulty in obtaining capital at once. The mineralized area of the camp is known to be about eight miles long and three miles wide. The surface showings are quite remarkable in the richness of the ore in copper and gold. Very prominent mining capitalists have already bought large interests and it will surely be but a short time before a large production will result.

The Du Boise gold dredge, operating at the mouth of Middle creek on the Sacramento river, a few miles above Redding, is working in a different manner from any other in the State. It is practically a suction dredge, a steel cylinder reaching to the bottom of the river and gravel being pumped up by powerful suction pumps. One man in a diving suit works on the bottom of the river cleaning out the crevices, etc., and manipulates the lower end of the cylinder. The machine is represented to have made a successful run this summer after the high water was over.

Representatives of the forestry service are now in Plumas county engaged in the investigation of alleged fraudulent location of timber lands made in the county during the past three years by the North California Mining Company and others. They have commenced field-work inspection of the locations of timber lands made under the mineral-land laws. The holdings of the North California Mining Company reach from Quincy to Bidwell's Bar in an almost unbroken stretch, along the line of the Western Pacific Railroad. The company built substantial camps in the various tracts and made these accessible from the old main thoroughfares. There are hundreds of miles to be traversed by new trails and wagon roads. The North California Mining Company has important camps near Quincy, Spanish ranch, Buck's ranch, French creek and in the Big Bar country. It has also many locations in Butte county in the north fork of Feather river.

Oil is found along the western boundary of the San Joaquin valley almost its entire length, but along the Sierra foothills on the east side no development of crude petroleum has yet occurred. A number of Madera people have recently become interested in lands where Merced and Mariposa counties corner against Madera's northern boundary, upon which there are very favorable indications of oil in paying quantities. About 12,000 acres have been bonded and arrangements are being made to proceed with development.

Willis G. Whitter, who claims a majority of the stock of the Auburn Gold Mining and Milling Company, owning the Buckeye mine, Forest hill, Placer county, has obtained a temporary injunction restraining the minority holders from electing directors at a meeting on September 11. Whitter claims that a scheme has been concocted to oust him from control of the company, notwithstanding the fact that the majority of the stock stands in his name. The minority stockholders allege that Whitter obtained the shares by fraud, and on this ground recently obtained an injunction forbidding him to vote them. He declares that he gave good money for the additional shares, and that the allegation to the contrary was made for the purpose of obtaining an injunction. He has a claim against the company of $38,392. The par value of all the stock is $200,000.

Duluth, Minn. Sept. 17.

There is some talk of all-rail shipments of ore the coming winter, but not much more than usual is liable to be sent down that way. Not, perhaps, because furnacemen will not want it, but for the reason that motive power for this additional business may be lacking, and further that the expense of handling ore that way is so great that furnaces cannot afford it.

The Duluth, Missabe & Northern and the Duluth & Iron Range have ordered 1200 steel ore cars of 50-ton capacity each. Locomotives to correspond will be ordered in a few days. Half the cars go to the Pressed Steel Car Company, of Pittsburg, and half to the Standard Steel Car Company. All are to be out before the opening of navigation next year. The third ore road in this State, the Great Northern, is still waiting the reception of 1000 cars ordered last fall from the Cambria Steel Company and its probable new orders are not learned. The Duluth, Missabe & Northern will move nearly all its allotment of 11,200,000 tons this year, and the addition of 800 cars will enable it to make a far larger tonnage next year.

The Stevenson mine, of Corrigan, McKinney & Co., will decrease materially this year, and its record to date indicates that not to exceed 1,000,000 tons, will be produced from the property this season. Last year it produced 1,428,000 and the year before that 1,652,000 tons. This mine has averaged more than 1,000,000 tons a year for the past six years, ever since it was first opened, but such a pace could not be maintained. The decrease from this mine, and the fact that all ore from the Monroe, which was under contract to ship over the Great Northern road, is going by the Missabe line, account in part for the slight increase of Great Northern shipments over 1905.

Corrigan, McKinney & Co. will open a new mine near the village of Aurora, Mesabi range, which will be underground and a shipper the coming year. This will give that firm four mines, Stevenson, Commodore, St. Paul and the new property.

Scranton. Sept. 18.

As a result of the stand taken by residents of Columbia county for an equitable assessment of coal properties, the movement is extending all over the coal region. Already the commissioners of Lackawanna county have called the assessors in and given them to understand that any failure to tax justly all coal corporations will be prosecuted, while the commissioners of Northumberland county have done practically the same thing. In Columbia county the commissioners have gone farther, and in an effort to secure a just assessment, have appointed assistant assessors for Centralia and Conyngham, where the crusade started and will also employ a mining expert to estimate on the coal properties.

The average price of anthracite at tidewater during the month of August, was $4.68 per ton, f.o.b., and, according to the report of Sliding Scale Commissioner Charles P. Neil, this means an increase of 3 per cent. to the miners' wages for that month.

The attorneys retained in the case against John Shaleen, in which the legality of the miners' certificate act is questioned, have received information that the United States Supreme Court will not pass on the case for at least a year. The act has already been declared valid by the Common Pleas Court of this county and the Supreme Court of Pennsylvania.

Toronto. Sept. 17.

The Montreal Refining and Reduction Company, J. E. E. Leonard, president, has commenced the erection of refining works at Trout lake, a few miles north of North Bay, on the Timiskaming & Northern Ontario Railway. The estimated cost of the works is $2,000,000 and the intention is to handle all kinds of ore, employing about 1000 men. Their capacity at the outset will be about 500 tons daily, but it is expected that this will ultimately be increased. The corner-stone of the plant was formally laid Sept. 10 by Hon. Frank Cochrane, Provincial Minister of Lands, Forests and Mines, in presence of a large concourse, many of whom came by special trains from New Liskeard, Cobalt, Copper Cliff and other places.

The lease of mining rights on the right of way of the Timiskaming & Northern Ontario Railway in the Cobalt area—the former granting of which occasioned so much scandal that it was disallowed by the Provincial Government—has been finally awarded, after a call for tenders, to an Ottawa syndicate on the same terms as those of the former agreement, a cash bonus of $50,000 and payment of a royalty of 25 per cent. of the value. The syndicate securing the lease includes J. P. Dickson, A. W. Fraser and T. A. Beament, who were members of the former syndicate, and also the new names of J. G. Turriff, Edmund Seybold and George Goodwin. The syndicate will at once transfer the lease to the Right-of-Way Mining Company and work on the claim will be started as soon as possible.

The strike made by J. Hummel in the new goldfields at Larder on Present lake is causing much excitement in the mining regions.

The project for the construction of a canal from Georgian bay to the Ottawa river may have an important bearing on the problem of electric smelting as a means of developing the large iron-ore deposits of the Ottawa valley.

Sonora, Mexico. Sept. 14.

Notwithstanding the efforts of Mexican national and Sonora State officials to diminish the gravity of the "16 September" feeling along the border, their redoubled precautions against an uprising have been very remarkable. Arrests have been numerous, the headquarters of the Sonora rurales have been moved from Magdalena and those of the State troops from Hermosillo to Cananea, while the United States troops at Fort Huachuca have been moved to points along the border, Nogales, Naco, Douglas and others. The entire Mexican govermental machinery has been active in following and arresting disturbers of the peace, and what time has not been given to this has been devoted to telling the press and public on both sides the line, how slight the possibility of disturbance was, and of how little consequence were those inciting trouble. The whole matter has been well handled, and the authorities deserve praise.

London. Sept. 8.

An important agreement has been made among English salt producers after many years' controversy, whereby the sale of salt shall be placed entirely in the hands of a selling syndicate. Ten years ago, it will be remembered, the Salt Union was formed with the object of consolidating the interests of producers. This union did not include every producer, so that its objects were only partially attained. In addition to local competition from these outsiders, German and American producers had to be reckoned with, sales and prices being affected by foreign as well as domestic competition. The syndicate that has just been formed is called the Northwestern Salt Company. All orders for salt will pass through its hands and will be distributed among the firms pro rata. No attempt will be made to manipulate the price to the detriment of the consumer, for foreign competition would not allow such a course. The syndicate will not control the total output of salt. Large quantities of brine are used locally in the Cheshire district by chemical manufacturers in the manufacture of electrolytic alkali, etc. The wells are their own property and the companies do not place any salt on the market, but use it all in their own works. The syndicate will have nothing to do with this, but will only control the salt which is sold on the market. Some of the salt controlled by the syndicate is sold to chemical manufacturers, who own no wells, and the remainder goes for table use. It is not expected, either by the chemical manufacturers, or by the grocery stores, that the formation of the syndicate will cause any perceptible interference in their business. Among the companies interested in the syndicate, the Salt Union is by far the largest producer, but the United Alkali Company, Verdins, and Murgatroyds have also a considerable output, and there are half a dozen or so smaller concerns in the syndicate as well.

It is probable that your daily papers in America have published accounts of an expedition that has recently set sail from England to an unknown land for the purpose of locating a fabulously rich diamondiferous deposit. Sensational paragraphs and articles have appeared in the English press and they may have been reproduced with additions in America. The expedition, according to the newspaper reports, has been undertaken in order to locate diamondiferous land discovered by a certain Captain Jones, who died before he could profit by his discovery. He, however, left behind him memoranda, which, in the opinion of a friend, were sufficiently useful to enable a prospector to follow the matter up. It is obvious that we have here the making of a capital romance, which would have delighted the heart of Robert Louis Stevenson. The land of make-believe is more attractive than reality and it seems wicked to have to tell the story from the sordid city point of view. However, like Mr. Gradgrind, I will get to facts. A certain promoter named Ernest Kenyon Collis came in contact with William Griffith, who used to be at the mines now owned by the De Beers Company. Mr. Griffith had in his possession some papers belonging to the late Captain Jones relating to some prospecting work done by him. Captain Jones' widow denies that Mr. Griffith has any right to the possession of these papers, but we will let that pass. Mr. Griffith put these papers, after sealing them up, in a joint trust between himself and Collis. On the strength of this Collis formed a company called the Collis Diamond Syndicate, Ltd., to which he sold his possession, such as it was. The capital of the syndicate is £25,000, divided into 24,500 shares of £1 each and 10,000 deferred shares of 1s. each. Of these Mr. Collis received 11,000 shares of £1 each and 5000 shares of 1s. each; Mr. Griffith received 4000 of the £1 shares and 5000 of the 1s. shares. Thus between them they received 15,000 of the £1 shares and the whole of the 1s. shares, in return for the sealed envelope. The agreement also gave them handsome salaries and the 1s. shares conveyed special privileges and profits. A ship called the "Xema" was chartered for four months and a staff of sailors, who could also dig, was engaged; the whole outfit headed by Mr. Griffith sailed at the end of August. In the meantime Mr. Collis was busy selling his own shares and up to the persent time has sold over 5000 of his £1 shares. The company sold 7000 out of the remaining 9500 £1 shares, and on these Mr. Collis held an option at £1 each. The shares have been sold, both those on which Mr. Collis had the option and those which he owned outright, at all sorts of inflated prices, so that he has made a large profit, at no expenditure on his own account, and in addition he gets a handsome salary and office expenses amounting to £2750 a year. The whole thing reads like a burlesque, but the promoter seems ahead so far.

General Mining News.

Sault Ste. Marie Canal—The total traffic passing through the Sault Ste. Marie canals for the season to Sept. 1 was, in net tons:

	1905.	1906.	Changes
East-bound.....	21,673,180	24,204,547	I. 2,531,367
West-bound.....	4,491,619	5,749,731	I. 1,258,112
Total.....	26,164,799	29,954,278	I. 3,789 479

The total number of vessel passages this year was 13,691, showing an average cargo of 2184 tons. The mineral freights included in the total were, in net tons, except salt, which is in barrels:

	1905.	1906.	Changes.
Anthracite.....	550,786	513,783	D. 37 003
Bituminous.....	3,427 034	4,412,419	I. 985,385
Total coal.....	3,977,820	4,926,202	I. 948,382
Iron ore.....	19,596,553	21,247,365	I. 1,650 812
Pig & manuf. iron	105,553	221,579	I. 116 026
Copper.....	56,580	62,033	I. 5,453
Building stone....	7,463	1,472	D. 5,991
Salt, bbl.....	257,206	276,551	I. 19,345

Anthracite coal and stone are the only articles showing decreases this year.

ARIZONA.

COCHISE COUNTY.

Benson Smelter—The small smelter at Benson, built as an oil furnace two or three years ago, remodeled and then kept in idleness, is to blow in, it is reported, when the new Dragoon road can begin hauling ore from Johnson camp. As the road is not yet built, nor the mines developed, it is still some time before this furnace will be operating at the best. Parties connected with the Arizona & Michigan Development Company, at Johnson, are interested in this smelter.

Paradise District—The Chiricahua Development Company, the original large concern in the district of that name, has abandoned its option on the Burns claim, and definitely given up. This is a bad comment on the Paradise district, but there is as much work under way there now as ever, and other properties are said to be looking well. These include the Manhattan, Sullivan, Bermudy, Sauvage, Cochise and others. Burns is at the camp with Eastern men, who may take up the options abandoned by the Chiricahua Company.

Superior & Pittsburg—Junction shaft of the mine at Bisbee will soon be a shipper, and preparations are under way for handling ore from there. The shaft is now down 1150 ft., and is to be continued gradually to 1400 ft., at which point the new pumps ordered not long ago will probably be installed, though the diminution of water in this and Briggs shafts may lead to a revision of plans. The water in Briggs is now down to about 1000 gal. a minute and is not troubling miners at all.

Tombstone Consolidated—This company, at Tombstone, is well through its trouble with water, and it has had an even more serious time than the Superior & Pittsburg. It has something like 8500 gal. of pumping capacity in the main shaft. Shipments to El Paso smelters are going forward daily, and the underground development is increasing ore reserves.

GILA COUNTY.

Globe Consolidated—This company, at Globe, is now working with much vigor, and is sinking a large three-compartment shaft on its Gem claim, which is to go down to at least 1000 ft. This shaft is going down near ore, and it is proposed to drift into the orebody in a short time. Work is also under way in the development of ground close to the Old Dominion's large ore deposits.

Old Dominion—A new orebody which promises to be of much importance has been discovered on the fourteenth level. The ore assays high in copper, iron and sulphur. Since Sept. 1, the company has been producing copper at the rate of over 4,000,000 pounds per month.

GRAHAM COUNTY.

Arizona Copper Company, Ltd.—This company reports the production of its mines at Clifton in August at 1105 short tons of copper.

CALIFORNIA.

AMADOR COUNTY.

Argonaut—At this mine, Jackson, where the main shaft is 2400 ft. deep, sinking is to continue for at least 200 ft. more.

Kennedy—In this mine, Jackson, a new compressor is to be installed to run 15 more drills.

CALAVERAS COUNTY.

Nassau Copper Company—This company is operating the Goat Ranch mine at Pools on the Miller road, and is stoping its ore for reduction, at the rate of about eight tons daily. The mine, owned by A. S. Pool, is being operated under a bond. Twenty men are employed.

Howard—This company at Red Gold, near Murphys, C. A. Howard, manager, is opening the old workings of the Louise mine, which has been idle for many years.

Calaveras—This company, F. C. Hammond, superintendent, is about starting work on the old Petticoat mine at Railroad Flat, which has been idle some time.

Ozark—At this mine, Quartz Gulch, Peter Michler owner, rich gravel has been found and the force of miners has been increased.

INYO COUNTY.

Chrysopolis—At this old camp, long deserted, A. S. Lochrie, of Big Pine, with John Black and Robert Steward, has made a find of high-grade gold ore. It is only a mile from the site of the old Chrysopolis mill.

MARIPOSA COUNTY.

Champion—At this mine, near Coulterville, owned by N. S. Ray, Mentzer Bros., and Daniel Wagner, a rich strike has been made. The mine has been idle some months, but was only recently pumped out.

NEVADA COUNTY.

Pennsylvania—The electric pumps put in use at this mine, Grass Valley, have proven satisfactory, and the water having been removed, more men will be put at work.

Celina—This new company has been organized with A. H. Fickett as president to develop a group of quartz claims near Washington, in the vicinity of the Gaston and Ethel mines.

If—In this claim, three miles from Nevada City, recently taken up by F. H. Lloyd and W. J. McOrrie, of Grass Valley, ore has been found. Though work has been progressing but a short time on the claim, excellent results have been obtained. A 2-ft. ledge has been encountered which is rich, not only in free gold, but is very heavily sulphureted as well.

PLACER COUNTY.

Consolidated Hathaway Mines Company—It is reported that this property near Newcastle will be opened up and equipped with an electric plant.

RIVERSIDE COUNTY.

Magnesite—Work has been resumed on the magnesite claim five miles southwest of Hemet. The property has recently changed hands. It was reported the former owners would develop the mine on a big scale, but it now appears a new company has purchased the property and begun operations.

SAN BERNARDINO COUNTY.

Kane's Springs District—San Diego men have purchased six mining claims in this district, 10 miles from Newberry, on the Santa Fe line, and development work has commenced.

SHASTA COUNTY.

Spread Eagle Group—Work has been commenced on this group owned by Orr Brothers, adjoining the Balaklala copper property on the south. Preparations have been made to put in compressors and drills. The group is under bond to M. E. Dittmar and others.

Golinsky Group—A. W. Fostner, acting for Eastern men, has bonded this group of copper claims at Kennett.

Great Western—This company, owning the Afterthought mine at Ingot, is to reopen the Liberty group at Copley, and work has commenced cleaning out the tunnels and drifts.

SIERRA COUNTY.

South Fork—The main tunnel is now in 4300 ft., and work upon it is being done by three shifts of miners. The face of the South Fork main tunnel is 646 ft. from the Maple Grove gravel mine, which has the southerly extension of the Bald Mountain and South Fork channels.

SISKIYOU COUNTY.

Coal—A. H. Denny and R. C. Crawford, who own the Herr place between

Ager and Yreka, are to recommence operations on the coal vein. The work of coal mining was suspended on account of the machinery being insufficient. It is the intention to use boring machines for testing the coal vein before sinking shafts.

Water—The water supply is drying up rapidly at present in the mining districts, and nearly all the hydraulic claims have been shut down. There is a scarcity also for the batteries in the steam- and electric-power mills, which will continue until cooler weather.

TRINITY COUNTY.

Enterprise—At this mine, Mark Manley, manager, a drift has been run 35 ft. in each direction from where the ledge was cut, and rich ore encountered all the way. The ledge is 2 ft. wide. Specimens show plenty of free gold.

Beaudry—G. H. Whitelaw, who has an option on this property at Minersville, is working a force of men fitting up the claims to take advantage of next season's water flow. The mine will be opened and worked in three places. The work is retarded by the scarcity of labor.

TULARE COUNTY.

Magnesite—W. P. Bartlett, who owns the extensive magnesite properties near Porterville, has started up his calcining furnaces and will keep them running as long as the weather permits.

COLORADO.

LAKE COUNTY—LEADVILLE.

There is a dearth of good miners and a lack of smeltermen, causing the temporary closing down of several mines and the idleness of two furnaces. At the smelter only eight furnaces are in full blast, instead of ten, and several hundred loaded ore cars are standing in the yards with no men to unload them. The Little Jonny mine had to close down on account of the inability of the smelter to handle the ore, and the management took advantage of this to repair the four shafts; this work will be completed soon, when the mine will resume shipping.

Louisville—It has already been stated that a lateral was run from the Yak tunnel to this shaft, cutting it at the 600-ft. mark. Since then the balance of the shaft, 350 ft., has been unwatered and cleaned out, and when the electric hoist is in place underground work will be started. Recently the Yak tunnel people have been putting down drill holes in the neighborhood of the Louisville territory, and last week two of the drills passed through 40 ft. of good sulphide ore; the management refuses to give out the exact values of the strike, but states that it is as good a body of sulphide as has been opened in the tunnel. The owners of the Louisville will drift to the orebody and thoroughly open it in their ground.

Reindeer—For the past few months a great deal of prospect work has been done in this property; the shaft has been sunk to a depth of 850 ft. and levels run from different stations. At the 600-ft. level a drift was carried in a southwesterly direction 300 ft., which has opened up the same orebody as was found at the 450-ft. level, and from this drift 100 tons daily are being shipped. The ore in character is the same as that first opened in the mine, hard and sand carbonates, netting the owners $20 per ton. Development work is also being carried on at the lower levels and the chances for catching the 600-ft. orebody are very favorable.

Winnie—This mine, belonging to the New Monarch Mining Company, Big Evans gulch, during the week shipped a carload of high grade that runs from 15 to 56 ounces gold per ton. The ore was taken from a 10-in. streak found in one of the stopes in the regular body of ore. Manager McDonald states that the rich streak still holds out, and that it has been opened up for over 300 ft., and he is taking out daily 500 lb. of the rich ore.

Keystone—This mine, in Big Evans, south of the Mammoth, is under lease to M. E. Nicholson and associates, and they are prospecting the ground with diamond drills. Two drills are at work and the results so far are satisfactory.

McNulty Shaft—This shaft, on Lower Rock hill, has gained a depth of 750 ft. and entered the solid formation. At this point sinking ceased and diamond drills are now being used to prospect the lower strata.

Long & Derry—Work has been started on this property by P. W. Breene and associates. A new incline shaft will be started from the foot of the hill and driven beneath the lower contact, and from this point development work will be carried on. The company has put in the treasury $50,000 to carry on development work.

Miller Group—The stamp mill on this property, Lackawanna gulch, will start up during the week and run on ore that has been stacked on the dump. The Miller shaft is down 85 ft. and at the bottom the vein is 12 ft. wide, with a streak 4 ft. wide that runs high in gold; the balance is milling ore. The property is located above timber line and the ore has to be packed to the smelter and mill, making the cost of transportation high.

Ruby—Ore from this property, Red mountain district, Twin lakes, is being shipped to the smelters and the balance is being stacked on the dump, waiting for the completion of a concentrating mill that is now in course of construction. When completed the mill will turn out 50 tons daily of concentrates and will first run on the 10,000 tons of ore that are on the dumps. Both mine and mill will run during the winter months. A wagon road is being constructed from the main road to the mine. The property is owned by Barnes Brothers.

Robert E. Lee—All of the old drifts and stopes in the upper workings of this property have been cleaned out and the lessees are now in a position to commence breaking ore.

A. V. Shaft—This shaft, foot of Harrison avenue, has secured a market for a limited supply of manganese ore and is sending out 600 tons monthly. This can easily be increased whenever the steel works at Pueblo are in a position to take more.

SUMMIT COUNTY.

North American Placer—A combined London and New York syndicate has been having this property on the Swan river thoroughly tested by drills. The work has been going on for three months now with three drilling machines constantly in operation. The ground is known to contain some very rich patches, but affairs have been grossly bungled for some years. With proper management the property will pay well, and most of the ground can be dredged to advantage.

Country Boy—The outlook of this property is improving every day. The big ore shoot of high-grade zinc is continuing to open out in width.

Wellington—The Wellington Mines Company has now agreed upon the purchase of the Oro mine, and the title to that rich, old-time producer will be handed over about the end of this month. Assays from the new strike gave returns of over 1 oz. gold, with about 25 per cent. lead and 21 per cent. zinc per ton. The erection of the new mill will probably be started next month.

Orizaba—The pay streak is now from 3 to 6 ft. wide, and all of shipping grade. The ore is rich in black sulphurets, and carries wire silver also. Shipping will be commenced as soon as the ore bins are completed, and the wagon road connection is made to the tunnel mouth.

TELLER COUNTY—CRIPPLE CREEK.

Considerable interest is being taken in cyaniding low-grade oxidized ores. A number of the mines are erecting mills for the treatment of their dumps and other low-grade ores and several mills are being erected outside of the main mineral belt. Talk of the drainage tunnel continues, and it seems that it must be started before long.

Isabella—This company is busy erecting a cyanide mill to treat a large amount of dump rock and low-grade ore in the mine. The property is being worked by the company and leasers. George Kilborn is general manager.

Forest Queen—Operations are resumed on this property, which has been idle since the first of June when the old lease ran out, by Roach and McCormack, of Chicago.

Acacia—A good strike was reported this week on the lease of the Standard Mining and Development Company in the South

Burns shaft. This is shipping a large amount of good ore.

Homestake—Some of the owners have been visiting the district recently from the East. The rumor that the large mill will soon resume operations is denied. The smaller mill, which is under lease to the Ironclad Milling company, is doing well.

GEORGIA.

FANNIN COUNTY.

A discovery of copper ore is reported in this county, which is not far from the Tennessee line.

INDIANA.

PIKE COUNTY.

The talk of a find of silver ore in this county continues, and some local parties are preparing to put money into prospecting. State Geologist Blatchley is not sanguine about the silver possibilities, but insists that Pike and adjacent counties have iron ore of excellent quality. Mr. Blatchley expects this industry will be developed to a considerable extent within the next few years.

LOUISIANA.

CALCASIEU PARISH.

Jennings—The Wilkins Oil Company has sold its leases and the famous oil well Wilkins No. 2, which has produced over 2,500,000 bbl., to C. B. Zeigler & Co.

Crowley Oil & Mineral Company No. 21 came in Aug. 31, but the bailer is still in the hole and on accurate knowledge of its capacity is known.

The Franklin Oil Company will drill a well about one-half mile east of the proven field.

Louisiana produced 81,000 bbl. more oil in August than in July, but the production was not stable. Three new wells flowed 4000 to 5000 bbl. daily when first brought in, but they soon went dead. They may be large producers, however, when air pressure is applied. Spot crude on cars is scarce and some sales have been made at 60c. lately.

MICHIGAN.

IRON-GOGEBIC RANGE.

Oliver Iron Mining Company—A large footwall shaft is being sunk on the Oliver Company's Davis land, between Ironwood and Bessemer, Gogebic range. It is to go down more than 1000 ft., and is of the same size and character as the big steel-lined shaft of the Norrie, recently completed. The timberway in this shaft is to be 5.5x10 ft., so that a car of timber can be run in and sent down without standing the timbers on end, or touching them after placing them on the car. It will open the company's Section 13, which is generally supposed to carry the extension of the Bonnie orebodies on the deeper dikes of the Newport mine on which the Oliver Company has done some drilling. It will also open the Davis at depth, and the Geneva and Royal, all belonging to the same company.

MINNESOTA.

IRON—MESABI RANGE.

Hobart Iron Company—This company, operating the Hobart mine in 25-50-17, has been pumping very heavily, but is now draining a small lake near the mine and is thus diminishing the flow materially. The Hobart is installing a 3000-gal. Prescott pump to replace 14 smaller pumps now in use. The mine is associated with the Pittsburg Iron Ore Company, of which Joshua Rhodes is president, and which operates, in addition to the Hobart, the Nassau, LaRue, Croxton and Brunt, but not all of them under the same corporation name. Brunt, LaRue and Croxton are shippers, the former a new one, and they will produce this year about 400,000 tons. LaRue and Croxton are neither producing as much ore as was expected earlier in the year, by reason of a shortage of cars and because rock has been found in places where it was not expected, and thus ore development of the year has been impeded somewhat. Additional stripping will be done at LaRue this winter and Hobart will probably be made a stripping mine, though it has been opened thus far as underground.

Tesora—The Duluth & Iron Range road is laying tracks to the new Tesora mine, in 9-58-16, which is to be opened at once, and which will make shipments next year.

IRON—VERMILLION RANGE.

Vermillion range ore shipments have increased the past week, both from Ely and Soudan. At the latter point a shovel has been put in stockpile and an additional train has been placed on the Ely ore run.

Pine Island—Merrit & Coffin have leased to the Biwabik Mining Company their tracts on Pine island, Lake Vermillion, on a 25c. royalty and a comparatively small minimum. The lessee will at once begin exploration and hopes to place some diamond drills very soon. There is a slaty hematite formation across part of the island, which has never been tested, and is supposed by the owners to be of value.

MISSOURI.

JASPER COUNTY.

Schifferdecker Land—The Mackinaw Mining Company, recently organized with a capital stock of $150,000, has taken a lease on 40 acres of the Schifferdecker land situated east of Duenweg and near the old camp of Scotland, and will commence development work at once. A shaft is being sunk on a drill hole which showed a 50-ft. face of zinc-bearing ground between the depths of 130 and 180 ft. In all, nine drill holes were put down and ore found in all of them.

Granby—This company is preparing to do much prospect work on its holdings in this and Newton counties. Three big drill rigs were ordered some time ago for this purpose, and when they arrive one will be used in the Joplin district proper, one at Oronogo and the other in the development of the land recently purchased in Newton county.

Connor Land—Al. Maness, who has taken a sub-lease on a portion of the Lima Mining Company's lease on the Connor land southeast of Webb City, is now drifting on a rich run of ore. On taking the lease he commenced sinking a shaft and went through a 20-ft. run of zinc and lead dirt above the 110-ft. level.

Red Jacket—This company, operating on the Granby Mining & Smelting Company's land at Oronogo, has started the new concentrating plant.

Jersey P.—State Mine Inspector Walter Ragland has ordered the permanent closing of the Jersey P. mine at Alba, in which Frank Henley lost his life and three others were severely injured last week, by caving ground. Mr. Ragland made a personal inspection of the ground and decided that it was too dangerous to be worked. The mine has been a good producer but the formation of the ground makes it unfit to work.

ST. FRANCOIS COUNTY.

New Electric Road—Surveys have just been completed for a new electric railway that will pass through the level belt to St. Louis, via De Soto and Hillsboro. As strong interests are said to be behind the enterprise, it is likely to be built within the next year or two, to the very great advantage of the lead district.

Bonne Terre—The St. Joe Lead Company has begun a complete sewer and water-works system for Bonne Terre that will prove very beneficial in eliminating typhoid fever. Bonne Terre is now a town of at least 5000 and depends mainly on wells and cisterns. The new water supply comes from wells 732 ft. deep through the deep sandstone to the underlying granite. It will require over a year to complete the work, the expense of which is borne entirely by the St. Joe Company.

Owl Creek—On account of the increased output from the Hoffmann mines the St. Joe Lead Company is going to erect 10 more roasting furnaces at Owl Creek.

MONTANA.

BUTTE DISTRICT.

Amalgamated—The total quantity of copper, silver and gold produced through the Washoe smelter for 50 months, which covers the period of entire operation from the time the plant was started up to June 30 of this year, was given out by E. P. Mathewson, manager of the plant, in testimony given before Master-in-chancery Crane in connection with the famous smoke case here. It aggregates 590,947,335 lb. of copper, 25,898,550 oz. silver and

164,806 oz. gold. During the last eight months of 1902, the first period of operation, the output of copper was 82,992,361 lb., and during the first six months of this year it was 94,244,911 lb. In 1903 the production was 109,726,420 lb.; in 1904 it was 138,078,499, and in 1905 it footed 165,905,144 lb. In the first eight months the output of silver amounted to 3,368,183 oz.; in 1903 it was 5,190,879 oz.; in 1904 it was 6,481,318; in 1905 it was 7,046,485, and for the first six months of this year 3,811,735 oz. The gold production was 15,027 oz. in the first period, 31,183 the second year, 46,344 the third, 49,685 last year and 22,567 oz. for the first six months of this year. From these aggregates must be deducted the minerals of North Butte for last year and this year. Added to Amalgamated production is the mineral output of Boston & Montana, which has for some time aggregated 7,500,000 lb. of copper per month, together with considerable gold and silver. With North Butte and Coalition cut out and Boston & Montana added, the output of copper for Amalgamated this year will almost reach 200,000,000 lb. Boston & Montana may run a little short of ore during the last half of this month on account of the closing of the West Colusa mine for repairs in the shaft. This mine yields between 30,000 and 32,000 tons of ore a month. The company usually keeps 10,000 tons in transit between the mines and smelter, but now has only 5000 tons.

Pittsburg & Montana Copper—This company is figuring on equipping No. 2 shaft with larger hoisting machinery and sinking to a depth of 2000 ft., 800 in addition to present depth. Development west in levels from winzes from 150 to 200 ft. deep on the 1200 has demonstrated the permanency of copper orebodies, and that the greater the depth the better the ore and wider the veins. Production now aggregates 140 tons a day.

Coalition—The new vein opened on the 1500- and 1600-ft. levels of the Cora has widened from 7 to 16 ft., 11 ft. of which carries 13 per cent. copper while the other 5 ft. runs 7 per cent. If this body holds out, the mine will be one of the most important in the Coalition group.

La France—Another vein has been opened in the Lexington about 100 ft. north of the old one and drifting in it is under way. The ore is copper-silver and is said to be rich in the former metal. The lower levels are still under water, and although pumping and tanking is progressing rapidly, not much headway is made. Since the destruction of the Montana Zinc Company's plant by fire there has been no market for the zinkiferous product of the property.

Davis-Daly—This company has begun sinking two shafts and is preparing to sink another. The crosscut going south from the 1800-ft. station of the Original is about 600 ft. long and has reached the north side line of the Thomas, a Davis-Daly claim. The company expects to cut a vein with this opening in 300 ft., or thereabouts.

NEVADA.

ESMERALDA COUNTY—GOLDFIELD.

Miners' Strike—A strike has been begun, the outcome of which is uncertain. All the producing mines have closed down, and no leases are being worked. This action was taken as a result of a special meeting of miners on Sept. 10. This meeting was held to consider the question whether the Miners' Union would still continue to support the Industrial Workers of the World, an organization of unskilled labor that has been making itself very obnoxious to the community. The miners decided to support it. The town and camp were all stirred up, and it was then that some of the mine owners, notably George Nixon, the largest operator in the camp, notified the officers of the Miners' Union that the union would have to withdraw its support from the Industrial Workers of the World, or the mines would be shut down. This led to the meeting, which resulted in a vote to stand back of the Industrial Workers, but take control out of the local officials' hands, placing it in that of the Miners' Union.

LYON COUNTY.

Douglas—The Nevada Douglas Copper Company is about to be launched under Utah laws to operate the Douglas mine at Yerington. Prominent Salt Lake men are interested and J. D. Wood is to be president; Frank J. Haggenbarth, vice-president; Walter C. Orem, secretary and manager. The new company contemplates the building of a spur to connect with the Southern Pacific Railway at Wabuska, and will follow this with the construction of reduction works. During the past year the Douglas is credited with an output of 1600 tons of ore that averaged about 13 per cent. copper.

NYE COUNTY—TONOPAH.

Nevada Smelting Corporation—Malcolm M. Macdonald, managing director, is leaving Tonopah to inspect the company's claims in the Kawich mountains. He proposes to visit the Goldreed, Clifford, Bellehelen, Reveille, Golden Arrow and Eden mines, and select a central site for the smelting of the ore from each property. As soon as a site is determined on, a smelter will be erected, as large orebodies containing lead and gold are developed in the Reveille and Goldreed mines, awaiting smelting facilities. The company has lately purchased a controlling interest in the Golden Silver Peak claims, 15 miles southwest of Silver peak, and will at once start development operations.

Midway—This company has declared its regular 5c. quarterly dividend, payable Oct. 1. The usual shipments of high-grade ore are going forward weekly. Work below ground is chiefly confined to advancing the north and south crosscuts from the 835-ft. station.

New York—In this mine the crosscuts from the 800-ft. level are being advanced as rapidly as possible. The south crosscut is now out 165 ft.; the north is approaching 120 ft. Several stringers of quartz have been cut. It is generally believed that the shaft should be continued a couple of hundred feet farther into the lower andesite before extensive crosscutting is undertaken.

Montana-Tonopah—A number of men are engaged in excavating foundations for the new 40-stamp mill which will shortly be erected on this mine. There has been a delay on the part of engineering firms in submitting bids for the construction of the plant, and Manager Mark B. Kerr has gone to Salt Lake City and Denver to place orders, and hurry on construction work.

Ore Shipments—The ore shipments over the Tonopah railroad for the week ending Sept. 6, as reported by the Western Ore Purchasing Company, aggregated 3691 tons, divided as follows: From Tonopah, Tonopah Company, 810 tons; Tonopah Extension, 365 tons; Belmont, 347 tons; Midway, 96 tons; Montana-Tonopah, 130 tons; West End, 47 tons. From Goldfield, 1869 tons.

NYE COUNTY—MANHATTAN.

Consolidated—The main shaft has reached a depth of 160 ft., and trouble has been experienced from an inrush of water. It will probably be necessary for a pumping plant to be installed before the ledge can be worked from the shaft. Good progress is being made with the main tunnel. It is now in a little over 500 feet.

Chipmunk—A 20-h.p. gasolene hoisting plant is being erected. As soon as it is in working order shaft sinking will be resumed. The vein in this mine is 12 ft. in width, and averages $60 per ton.

Desert Queen—Some fine specimen ore has been cut in this claim. It is free gold in white limestone. Further developments will be watched with interest.

NYE COUNTY—BULLFROG.

National Bank—The shaft, which has reached a depth of 270 ft., is in hard blue rhyolite. The drift at the 100-ft. level has exposed the vein for a distance of 420 ft. It is from 20 to 30 ft. in width, and assays well.

Shoshone—A consignment of 2000 tons of high-grade ore is awaiting shipment as soon as railroad communication is established. The manager is in San Francisco signing a contract for the construction and erection of mill of 400 tons daily capacity. This plant will be erected as soon as it can be placed on the ground.

Gold Bar—A new strike of rich ore has been made. Several assays have shown

over $500 per ton. The ore is being sacked for shipment.

Yankee Girl—The shaft has been sunk to a depth of 320 ft. The formation at the bottom is porphyry and rhyolite. It is proposed to commence a station at 300 ft., and drift to cut the National Bank veins which run into this property.

Mayflower—Development in the 200-ft. level are promising. Good milling ore has been opened up in several places, and the vein is less broken than when first opened.

WHITE PINE COUNTY.

Requa—The Northern Railroad, to operate from Cobre, a station on the main line of the Southern Pacific, to Ely, a distance of 140 miles, will be formally opened to traffic Sept. 29. The railroad headquarters, as well as the smelter of the Nevada Copper Company, will be situated about 13 miles from Ely. A new townsite has been laid out and will be called Requa in honor of M. L. Requa, manager of the railroad and copper companies.

PENNSYLVANIA.

ANTHRACITE COAL.

Pardee & Co.—Every man and boy employed in the Cranberry mine of A. Pardee & Co.—and there are 200 of them—will receive back pay of 3c. a day, from April, 1903, as a result of a recent decision of the Conciliation Board. At that time the company reduced the pay of each man, contending that it was for an allowance which had formerly been made on oil. Before the board it was proved by the men that, for many years prior to that time, they had been paid a certain amount and that there had not been any mention of an allowance.

Philadelphia & Reading Coal and Iron Company—Heroic measures are about to be taken by the company to smother a mine fire in the abandoned Anchor colliery, at Heckschersville, which has been burning since 1869, a period of 37 years. A fire broke out in the Anchor mine prior to that time, and every effort to control it failing, the mine was flooded. Recently a new mine, the Pine Knot shaft, has been opened near the old Anchor, and it was intended that this should be the outlet for the large quantities of coal still remaining in the old mine. When the Pine Knot was completed and everything was in readiness to take out the coal, pumps were placed in operation in the Anchor mine and the water was taken out rapidly. It was feared that the mine might still be afire, and the fears were confirmed. After the hight of the water had been materially lessened, it was found that, though the mine had been flooded for nearly 40 years, it was still on fire, so that the new colliery is also endangered. Plans were at once taken for more effective measures to quench the flames and holes are being drilled over the old Anchor workings, through which the mine will be filled with slush. It is hoped that, by so doing, the air will be shut out.

BITUMINOUS COAL.

Thomas J. Hawkins, of Pittsburg, is going to open a coal mine on his tract of 930 acres at Derry, Westmoreland county. The land lies within 1500 ft. of the main line of the Pennsylvania railroad between Derry and Latrobe and most of it is covered with a good growth of hardwood timber. The coal is of the Freeport variety and the vein is 7 ft. thick. E. J. O'Brien, of Latrobe, has been engaged to open the mine and a large force of men is now working on a drift opening.

SOUTH DAKOTA.

CUSTER COUNTY.

Saginaw—The vein of ore recently struck on the 400-ft. level. has been crosscut 8 ft. and no walls reached yet. There are five parallel veins on this ground, and they will all be opened up on each level to give ample stoping room.

LAWRENCE COUNTY.

Lucky Strike—Practically all the funds for building a 30-stamp mill have been raised among the stockholders. The machinery has been contracted for, and arrangements for building, grading, etc., are being made. There are about 1600 ft. of workings on the ground, and a ledge of milling ore has been opened up. The company has a hoist, air-compressor, and sawmill, and has just completed patenting its 314 acres of land. A 250-h.p. boiler and a 200-h.p. engine for use in the mill have been contracted for.

Eleventh Hour—At the annual meeting of this company, it was decided to issue bonds to the amount of $60,000, the money to be used for patenting the ground and for providing working capital. The following officers were elected: President, R. B. Adams, Buffalo; vice-president, J. T. Harrington, Deadwood; George P. Baldwin, Chicago, secretary-treasurer.

Hidden Fortune—At a special meeting the plan of the directors for a consolidation with the Columbus Mining Company was ratified by a vote of over two-thirds of the stock. The Columbus stockholders will meet in Denver this month to take similar action.

Homestake—The largest boiler ever brought into the Black hills has just been received by this company to be installed in the slimes plant which is being erected in Deadwood. It weighs over 21 tons, and is one of a pair, each of which will furnish 350 h.p. for the plant.

Reliance—The building for the 150-ton mill on Annie creek is completed, and the machinery is being set up as fast as it arrives. About 30 men are at work and the ore-bins are now completed and will be filled in a short time as it is the policy of the company to keep a supply of at least 2000 tons in reserve.

Gilt Edge Maid—This company is making a low record for the treatment of ore where it is necessary both to hoist and to cyanide. The entire cost is now less than $1.20, and the management expects to reduce it to 90c., or $1 a ton. The mill, with its new process of dry crushing, is treating 175 tons a day, and the ore will average a little less than $3 a ton. Only one 10-hour shift is employed daily.

PENNINGTON COUNTY.

Cumberland—The mill on this property has just been completed and will commence operations this week. It is equipped with 10 stamps weighing 900 lb. each, silver-plated copper plates, and a Sanford crusher with a capacity of 8 tons an hour. The ore is a blue and white quartz, occurring in the metamorphosed slates, and about 70 per cent. of the values can be saved by amalgamation.

TEXAS.

DALLAS COUNTY.

Dallas—The Texas Fullers' Earth Company, capital $100,000, has been organized here to operate a plant near Burton, in Washington county.

JEFFERSON COUNTY.

Beaumont—Wildcat operations developed no new pool in August and the daily output of the coastal fields on Aug. 31 was 51,700 bbl., as compared with 57,600 bbl. on July 31. Texas fields declined 1800 bbl. and Louisiana 4100 bbl. The Texas coastal output for August declined 145,000 bbl. Dayton and Batson were practically unchanged. Humble declined 95,000 bbl., Sour Lake 20,000 and Saratoga for the first time in many months showed a decrease amounting to 2500 bbl. While the August consumption was 275,000 bbl. less than in July, the total output of 1,670,000 bbl. fell short of consumption by 720,000 bbl., which was drawn from storage. The stored oil now amounts to 13,780,000 bbl., of which two-thirds is held by refinery interests. Crude is very strong and pipe-line companies on Aug. 28 advanced credit balances.

A recent fire on the Keith-Ward tract at Spindletop destroyed a large number of derricks, pumping outfits and other equipment, temporarily reducing the production.

The daily output and prices on Aug. 31 were: Humble, 9200 bbl., 55c.; Sour Lake, 5800 bbl., 62c.; Batson, 6900 bbl., 55c.; Spindletop, 2600 bbl., 65c.; Saratoga, 5800 bbl., 53c.; Jennings, 20,250 bbl., 48c.

The well summary for August shows 54 wells completed, of which 38 were producers and 16 dry holes. There were 49 wells drilling at the close of the month.

UTAH.

BEAVER COUNTY.

Oak Leaf Mining Company—This new

concern has filed articles of incorporation to operate in Beaver county. J. E. Robinson, of Beaver, is president. The headquarters will be at Beaver City; the property is near Milford.

CACHE COUNTY.

Logan Mining Company—This new concern, with headquarters at Logan, has filed its articles of incorporation. A. C. Cranny is president and N. W. Kimball, secretary.

JUAB COUNTY.

Tintic Ore Shipments—Shipments from this district, during the week ending Sept. 8, aggregated 113 carloads. The contributing mines were: Ajax, 22; Beck Tunnel, 13; Bullion Beck, 6; Carisa, 6; Centennial Eureka, 33; Dragon Iron, 5; Eagle & Blue Bell, 7; Eureka Hill, 10; Gemini, 5; Grand Central, 3; Joe Bowers, 1; Lower Mammoth, 1; Mammoth, 8; May Day, 2; Ridge & Valley, 2; Scranton, 4; Uncle Sam, 3; Victor Con., 1; Victoria, 6; Yankee Con., 4.

Little Chief—Shipping ore has been encountered on the 800 level of this property.

Carisa—The August output of this property was a little more than 2000 tons, averaging better than 4½ per cent. copper. The profit was about $20,000 and the usual dividend of $5000 was paid.

MORGAN COUNTY.

Copper Coin—This property near Coalville, but in Morgan county, has been bonded to J. H. Edgerly, of Chicago.

SALT LAKE COUNTY.

City Rocks—At the annual meeting of shareholders of this company, operating at Alta, W. S. Cleaves, of Hancock, Mich., was elected president; John Edwards, of Houghton, Mich., vice-president; James P. Edwards, of Houghton, secretary and treasurer; R. L. Edwards, of Salt Lake, manager and W. S. Zehring, of Salt Lake, assistant secretary. This company has contracted its output to the American Smelting and Refining Company.

Columbus Consolidated—This mine at Alta is undergoing examination by J. R. Finley, a Colorado Springs mining engineer, in behalf of the Boston stock exchange on which it is to be listed. The August receipts of this company aggregated about $80,000.

Taylor & Brunton Sampling Company—This organization is preparing to increase the capacity of its Salt Lake plants from 30,000 to 45,000 tons of ore monthly. Its competitor, the Pioneer Sampling Company, may provide equipment to handle 30,000 tons monthly.

Mountain Chief—This property of eight patented lode claims in Bingham has been bonded to C. D. Porter, of San Francisco, and others who will undertake their development. In a tunnel, 1000 ft. long, some ore has been exposed. The ground is favorably located.

SUMMIT COUNTY.

Magnolia St. Louis—The new hoist ordered recently for this Park City property is being installed.

Nelson Queen Consolidated—This company is sinking a double-compartment shaft. Assays have disclosed the presence of 68 per cent. lead, 22.5 oz. silver and 0.42 oz. in gold in a shoot of ore recently opened in the old workings.

New York Bonanza—Ore is being extracted for shipment from east drift of the 700-ft. level. A lot sold this week assayed 116.7 oz. in silver, 13.1 per cent. lead and $1.40 in gold. This shoot will soon be opened 60 ft. lower.

Park City Ore Shipments—During the week ending Sept. 8, these amounted to 5,087,600 lb. The Daly Judge sent out 1,489,000; Silver King, 325,000; Daly West, 1,000,000; Little Bell, 576,000; New York, 80,000; Ontario, 343,000; Jupiter, 23,000.

Ontario Silver Mining Company—Notwithstanding the great expense to which this company is being subjected in the work of reopening the drain adit, the costs of operation are a little more than being met by ore shipments from the upper levels.

Daly Mining Company—An orebody of considerable importance has been opened on the 1200 level of this company's property at Park City.

Little Bell—During August, the Little Bell mine at Park City sent to the smelter about 1000 tons of ore which brought about $30 per ton.

WASHINGTON.

OKANOGAN COUNTY.

Copper World Extension—Henry Bahrs has retired from the management, and R. J. Thomas, of Findlay, Ohio, has been appointed in his place. The crosscut on the 300-ft. level is in 62 ft. The shaft is being sunk below the 300-ft. level.

Palmer Mountain Tunnel and Power Company—Electric drills are being used for grading the various levels for the mill, near the portal of the Palmer mountain tunnel. The machinery for the mill will be delivered at a point on the Vancouver, Victoria & Eastern railway, 9 miles distant, about the last of the year, and will be hauled hence to its destination. Heavy T rails are being substituted for the lighter ones heretofore used in the tunnel. An electric locomotive will be used for drawing ore and material out of the tunnel, and also for development purposes.

FERRY COUNTY.

Belcher—The No. 4 tunnel has tapped the vein, and will be driven about 500 ft. farther to get under the No. 3 tunnel workings. A ground tram will be built 2200 ft. long from the portal of the tunnel to the ore bins of the Belcher mountain railway. It will take two weeks longer to complete the railway to that point. Ore shipping will begin immediately after the completion of the railway.

Oversight—A new surface discovery has been made at the base of the West Side hill, about 700 ft. west of the No. 2 tunnel. The ore is more silicious and, to that extent, differs in character from any other ore ever found on the group. It assays from $60 down to $12 in gold per ton. Similar ore has been found near by, in three other places, and all of it is reported by the assayer to carry considerable amounts of cobalt.

STEVENS COUNTY.

Bella May—A tunnel is in 83 ft. on a 5-ft. vein of high-grade silver-lead ore, from which 30 tons have been shipped.

Stirling Silver-Lead—This company is constructing a ditch to develop 2000 h.p., with a 250-ft. head. It will draw water from Sweet creek. The company owns two other water rghts. W. W. Warner, of Metaline, is manager.

Larsen Lead—This company is negotiating for the Roi Clark claims, at the mouth of Flume creek, on the west side of the Pen d'Orielle river. Twelve men are employed on them in prospecting, and also building a camp.

Metaline Mining and Smelting—This company owns 9 claims on the east side of Pen d'Orielle river, on Sullivan creek, and is doing underground development.

WISCONSIN.

ZINC-LEAD DISTRICT.

Koh-i-noor-Blende Mining Company—A large sheet of jack was shot into at the Koh-i-noor-Blende recently. The new large pumps are in and are keeping the water under control.

Vinegar Hill—Nearly all the new strikes that are being made, among them the Vinegar Hill, are finding the jack in strong water.

Chief of Police Mining Company—The Chief at Mineral Point continues to show up well. The ore that is being opened up lies in what appears to be a rich crevice.

Great Northern—Arrangements are being made to resume operations at the Great Northern. A pump and boiler will be installed in the near future.

Dark Horse—The pump at the Dark Horse has resumed operation and the ore that is being taken out indicates a rich run.

St. Anthony—The development at this mine has been along commendable lines. It is now stated by the management that the ground is in shape to produce sufficient ore to keep a mill running continuously. The 400 acres is owned in fee simple.

Grant—R. A. Kendell, of the Grant, reports that his company is in the market for a pumping plant.

Mifflin-Linden—The Coker mine, owned by the Mifflin-Linden Company, continues to be a heavy producer. A new shaft is being put down so as to relieve the incline shaft from some of the hoisting. The heavy water at the Coker necessitates a double installation of pumps and engines.

Big Jack—All of the machinery has been delivered to the Big Jack and it is expected that all will be in running shape by October. There are several hundred tons of mill dirt on the dump and a quantity of dirt is broken. The equipment at the Big Jack includes a 16x36 Corliss engine and a 16 and 10x14 Ingersoll-Rand "Imperial" type compound air compressor, having a capacity of 537 cu.ft. per minute. It is the intention to operate the main hoist, which is up on a hill, by compressed air.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA—PEACE RIVER DISTRICT.

A press despatch sent out from Edmonton, Alberta, gives publicity to information concerning what is described as a very important gold discovery made by a Dominion exploration party that has been at work in the Peace River district about two years selecting 3,500,000 acres of land, which the Province of British Columbia years ago agreed to convey to the Dominion Government in consideration of the latter aiding financially in the construction of the Esquimalt & Nanaimo railway from Victoria to Nanaimo, both on Vancouver island. It was stated that crude assays made with an improvised mortar, quicksilver, and nitric acid, indicated values ranging from $7.50 to $32 a ton; also that A. J. Macdonnell, leader of the party, brought out several sacks of rock, which he was taking to Ottawa to have subjected to an accurate laboratory test. Mr. Macdonnell is quoted as having stated that the gold-bearing dike is eight miles in length, as far as his men were able to learn; extending back to the old river bank, at the foot of a hill; crescent-shaped and about 5000 ft. in width; and ranging in thickness from 50 to 200 ft. The rock is soft, crumbling freely, and appearing like a deposit of hardened silt, lying with gravel above and below it. A number of claims were located by individual members of the exploration party and of the Dominion Northwest mounted police engaged in making a road from the Peace river country to Atlin, B. C.

Last spring it came to the knowledge of the Provincial Government at Victoria that free miners' certificates, without which no person can legally hold a non-patented mineral claim in British Columbia, had been taken out at a mining recorder's office in an outlying northerly section of the Province in the names of certain members of the Dominion Government and other prominent Eastern Canadians, so arrangements were made early in the summer for the provincial mineralogist (Wm. Fleet Robertson) to go to the Peace River district with the object of finding out what the occasion of such an unusual proceeding was. The late Dr. Geo. M. Dawson, in 1879-80, explored the country from Port Simpson, on the Pacific coast, to Edmonton, on the Saskatchewan river, and his official report, embracing a portion of the northern part of British Columbia and the Peace river country, was included in the Geological Survey department's published "Report of Progress for 1879-80." Dr. Dawson reported the occurrence of a big deposit of shale near the mouth of the North Pine river, about six miles east of Fort St. John and 17 miles from the boundary line between British Columbia and Alberta, which appears to be the neighborhood of Mr. Macdonnell's discovery. It is noteworthy that while the Province agreed to convey to the Dominion 3,500,000 acres of land in the section above-mentioned, it retained all rights to control precious metals contained therein. It is known that timber, coal and water power are abundant in the Peace river country, so that if the recent reports of the occurrence of gold in considerable quantity shall prove correct, conditions in these respects will be favorable to the establishment of an important gold-mining industry in the northeastern part of the Omineca mining division of British Columbia.

ONTARIO.

Laurentian Gold Mine—The last clean-up of the 10-stamp mills yielded gold valued at $8000, which has been forwarded to Port Arthur. There are also some 50 tons of concentrates at the mine, being two months' output of the concentrating plant.

Lorraine Township—A strike of calcite containing good values of native silver is reported in Lorraine township, some four miles east of Cobalt. The vein is 12 ft. wide at the surface.

Kent County Gasfields—An immense gas gusher, the flow of which is variously estimated at from 1,500,000 to 4,000,000 ft. daily, has been struck on the Halliday farm, six miles from Chatham. The strike was made at 1419 ft. depth.

YUKON TERRITORY.

Yukon Consolidated Goldfields Company, Ltd.—This company has contracted with the Canadian Westinghouse Company for the following electrical apparatus to be used in gold dredging on its property: Three 100-h.p., type F motors; three 15-h.p., type F motors; three 50-h.p., constant-speed induction motors; three 30-h.p. motors; three 20-h.p. motors; three 15-h.p. motors; three 7½-h.p. motors; nine 75-kw., oil-insulated, self-cooling transformers; two 625-kw., A. C. generators, and two 17-kw., type S exciters; one four-panel switchboard for controlling; four 250-kw., oil-insulated, oil-cooled transformers and four 200-kw. transformers, same type.

MEXICO.

SONORA.

Nacosari—Great interest is manifested in the district south of Nacosari, where Phelps, Dodge & Co. have their Pilares de Nacosari mines. Both the Nacosari and Southern Pacific roads have run surveys through the region with the view of early construction.

Cananea Central—Developments at the new Cananea Central, at Cananea, are very flattering, and rich ore is being opened steadily. On the old America, two more shafts are to be sunk, and those now down will be deepened, though ore is found close to surface, a peculiarity of this mine. Shipments to smelter have been smaller the past week than before on account of a change in development work underground, but will be increased to 100 tons a day very soon. Railway connections will be made at once, via the Cananea Consolidated Copper Company's line, with all the shafts of America and Cananea-Duluth, both of which are parts of the new company.

AUSTRALIA.

QUEENSLAND.

The largest operator is the Chillagoe Mining Company. Its Morrison mine is 324 ft. deep, and yields copper sulphide ore. The Penzance yields ore carrying 6 per cent. copper and 2.5 oz. silver per ton. The Zillmanton and Ruddygore yield similar ore. The Harper and Queenslander mines are worked mainly for low-grade fluxing material.

The company's smelter is treating 4000 tons of ore per month for an average return of about 160 tons of copper and 20,000 oz. of silver. The Huntington-Heberlein process has been successfully adopted for the treatment of Chillagoe lead ore.

The Smith's Creek Tin Company is developing a valuable tin mine. In the main shaft, at a depth of 30 ft., the vein is 6 ft. wide, and averages 4 per cent. tin. A new milling plant is being erected on the mine.

The Stannary Hills tin mines continue to develop well. In the Ivanhoe mine the vein is 15 ft. wide, and assays 4 per cent. tin.

Coal Trade Review.

NEW YORK, Sept. 19.

In the Eastern coal trade there is little new. The continuance of mild weather has kept down anthracite sales at the seaboard, and has had some effect on the seaboard bituminous sales also, although less than in the case of the anthracite. The coastwise trade is improving, especially to the far Eastern ports where stocks have to be laid in before ice makes. The manufacturing demand is very good all

over the East and steam coal would probably advance in price were not the supplies very large.

In the West the chief incident of the trade is the rushing of coal to the Lake ports in order to fill contracts for shipments to the Northwest before navigation closes. Complaints are heard everywhere of delays in transportation, and notwithstanding all the efforts of the railroads, car shortage increases. Shippers and dealers are anticipating bad blockades later in the season, and are taking rather a gloomy outlook as to winter conditions, when car shortage is a trouble so early in the season.

Some small labor troubles are noted in Indiana, chiefly on account of different interpretations of the new mining agreement, but it is probable that these will be settled without difficulty.

COAL TRAFFIC NOTES.

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Sept 8 were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	3,175 303	2,950,449	D. 224,854
Bituminous	19,670 040	21,565,743	I. 1,895,703
Coke	7,505,944	8,612 091	I. 1,106,147
Total	30,351,287	33,128.283	I 2 776,996

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Sept. 15 were 17,819 tons; for the year to Sept. 15 they were 537,197 tons.

Shipments of anthracite coal in August are reported at 5,400,511 long tons, an increase of 358,673 tons over August, 1905. For the eight months ending Aug. 31 the shipments by companies were as follows, in long tons:

	1905. Tons.	Per Ct.	1906. Tons.	Per Ct.
Reading	8,233,808	20.4	7,279,392	20.3
Lehigh Vy	6.585,352	16.4	5,453,119	15.2
N. J. Central	5,159,865	12.8	4,394,979	12.3
Lackawanna	6,166,516	15.3	6,013,391	16.8
Del. & Hudson	3,830,578	9.5	3,547,590	9.9
Pennsylvania	3,272,796	8.1	3,031,835	8.5
Erie	4 100,636	10.2	3,564,714	10.0
N. Y., Ont. & W.	1,894,547	4.7	1.565,563	4.4
Del., Sus. & Schu'l	1,061,480	2.6	917,177	2.6
Total	40,305,578	100.0	35,767,760	100.0

Every company showed some loss. The total decrease was 4,537,918 tons, or 11.3 per cent. The shipments by months in 1906 have been: January 5,458,048; February, 4,712,099; March, 5,745,868; April, 488,439; May, 3,276,310; June, 5,705,037; July, 4,981,448; August, 5,400,511; total, 35,767,760 long tons.

New York. Sept. 19.

ANTHRACITE.

The hard-coal market does not yet show any returning activity. Now that the disappearing discount is no longer operative, the state of the thermometer will be the determining factor in the condition of the trade. Some producers report even a smaller amount of business than during the mid-summer months, and none of them can foresee any activity until the cold weather comes in.

Prices will remain until next April at the following figures: $4.75 for broken and $5 for egg, stove and chestnut. In the steam sizes we quote $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; $130@1.35 for barley; f.o.b. New York harbor shipping points.

BITUMINOUS.

There seems to be a little improvement in the Atlantic seaboard soft-coal trade this week, but whether or not it is permanent, is hard to judge. It had been expected that trade by this time would be active, but this has not been the case.

Trade in the far East is improved, and the increased tonnage to this territory helps to enlarge the output from the mines a little more than in its due proportion. It is thought that consumers are trying to take advantage of the prevailing low freight rates in getting their tonnages. The Sound is quiet, and, outside of some sporadic orders, has not shown very much improvement. Trade in New York harbor is dull; no surplus of coal has yet appeared, but coal arriving often has to be sold at low figures to get rid of it. Good grades of steam coal are selling at $2.50@2.60 and gas coal for $2.25@2.30 f.o.b. New York harbor shipping points.

Transportation from mines to tide is good. Car supply is short, and, in case of a general demand, would be found much lacking.

Vessels in the coastwise market are in sufficient supply. Current rates from Philadelphia are quoted as follows: To Lynn, Newburyport, and Bangor, 75@80c.; to the Sound, 55c.; to Saco, 90c.; and to Gardiner, 85@90c. and towages.

Birmingham. Sept 17.

The coal production in Alabama is healthy. The miners are losing no time, and the railroads are doing better this year than ever before in furnishing the cars necessary. Good prices obtain for coal. The winter trade has opened up, and the indications are that there will be need for every ton of the product that can be produced. Much coal will be shipped out of the district, while the home consumption is exceedingly heavy. The labor situation is growing easier in the coalfields of Alabama, many of the union miners who were out on strike for more than two years now returning to work wherever their services are accepted.

Chicago. Sept. 17.

The improvement in the coal market continues, though its effects are slight from week to week. Supplies have been considerably restricted from both Western and Eastern fields, chiefly by car shortage, though there can be no doubt that many shippers are curtailing supplies to this market. In the anthracite market there is no improvement yet, retailers and consumers holding out for supplies when actually needed, with the certainty that there will be great congestion of traffic when orders arrive.

Illinois and Indiana coal especially is faring better, with screenings $1@1.50; run-of-mine $1.70@1.90 and prepared sizes $2@2.25. Circular prices hold well on Eastern coals, all of which are in good demand and light supply, Hocking being $3.30 for lump and smokeless $3.40; Youghiogheny $3.10 for run-of-mine.

Cleveland. Sept. 18.

The coal trade is a little stronger as to coarse coal, but somewhat weak as to slack. The movement up the Lakes has increased. This is directly traceable to the change in the upper Lake situation. For a time cars were scarce in the Lake trade due to a necessity to take care of the domestic situation. This was occasioned by a strong advance in coal prices locally. Some of the cars were taken out of the local trade and diverted to the Lake trade. This has increased, during the week, the movement up the Lakes. The better movement of Lake three-quarter increased the supply of slack and broke that price to 65c. at the mines. At the same time it shortened again the supply in the local trade, and brought about an improvement in prices. The result is that the domestic market is again getting so strong that cars will be sent back to relieve the demand.

The Lake boats are in such demand in the ore and grain trades there is not a large supply, above contract requirements, to take care of the wild movement. This is stiffening the Lake rates, but without causing an advance so far. Mine-run coal is selling at $1.05 at the mines. The coke market is strong. Ovens have withdrawn objections to first-half contract, on the basis of $4 at the oven for 72-hour foundry. The same price rules on spot shipments. Furnace coke is selling at $3 at the oven.

Indianapolis. Sept. 18.

Reports from various railroad centers in this State indicate that nearly every railroad is facing one of the greatest car famines ever experienced. Freight traffic officials have held a number of meetings and they admit that the situation is alarming. The officials say the movement of unprecedented crops has occasioned the present pinched condition, but the trouble is that the tonnage now is only about 60 per cent. of what it will be in December, when the bulk of the coal is handled. They say general merchandise and grain traffic continues heavier than usual and that the movement of coal is at least a month behind. Already the coal operators are making complaint to the State Railroad Commission of a lack of cars and lack of harmony among railroads. The commission will visit Terre Haute,

Sept. 21, to confer with railroad officials and coal operators with a view to devising some plan by which Indiana coal can be moved more expeditiously. The traffic men of the various railroads entering the Indiana coalfields have been invited to attend and assist in developing some plan to get Indiana coal to market. Operators say that Indiana coal is showing a gradual upward trend and they are uneasy lest the railroads fail to assist them in supplying the demand. Coal dealers say they are experiencing some difficulty in securing consignments to meet current demands for certain grades and this discourages the plan of stocking up coal.

The top-coal question which has been a source of considerable annoyance to the miners in the Eleventh district has taken a new turn and a call for a miners' meeting has been made. The purpose is to hold a special convention to refer the question to the entire district. Members of the locals back of the movement say that if they do not get justice in the convention an effort will be made to oust the officers. It also was stated that many of the Indiana miners are dissatisfied with the present organization and are preparing to withdraw from the United Mine Workers and join the Industrial Workers of the World. The top-coal dispute resulted from the decision of the companies to leave up a certain portion of the coal to make the roof safe. The miners contend that this is not necessary and that it reduces their earning capacity.

Pittsburg. Sept. 18.

Coal—Shippers are having still more trouble with the car shortage, which is the worst for this season in many years, and production is seriously interfered with. There is a large accumulation of river coal in the harbor. The water is low, but rivermen are hoping for a shipping stage by the end of the month. Prices are unchanged, $1.10@1.15 being quoted for mine-run coal on large contracts.

Connellsville Coke—There has been considerable selling of furnace coke for next year, at $2.75@2.85 for strictly Connellsville. The market for this year is very firm, at about $2.85 for furnace and $3.25@3.40 for 72-hour foundry. Production for the week in the Connellsville region amounted to 279,515 tons, a gain of 608 tons over the previous week, while shipments were slightly greater than the previous week, amounting to 12,138 cars, distributed as follows: Pittsburg district, 4318 cars; west of Pittsburg, 6406 cars; east of Connellsville, 1404 cars. Production in the upper and lower Connellsville regions through the first 30 weeks of the year, or about to the end of July, is estimated at 8,275,577 tons, or at the rate of 14,344,335 tons for the year. The actual output is expected to slightly exceed this. The rate thus far this year has been more than 10 per cent. in excess of production in the same period last year, which constituted a record.

Foreign Coal Trade.

Sept. 19.

Imports and exports of coal in Germany for the seven months ending July 31 were, in metric tons:

Imports:	1905.	1906.	Changes.
Coal	5,455,392	4,911,760	D. 543,632
Brown coal	4,449,927	4,899,303	I. 449,376
Total	9,905,3.9	9,811,063	D. 94,256
Exports:			
Coal	9,739,459	11,111,982	I. 1,372,523
Brown coal	11,695	10.789	D. 906
Total	9,751,154	11,122,771	I. 1,371,617

In 1905, the total imports exceeded the exports by 154,165 tons; in 1906 the exports were in excess by 1,311,708 tons.

Coal production in Germany for the seven months is reported as below, in metric tons:

	1905.	1906.	Changes.
Coal	67,358,403	78,776,259	I. 11,417,856
Brown coal	28,717,990	31,523,659	I. 2,805,669
Total mined	96,076,393	110,299,918	I. 14,223,525
Coke made	7,976,165	11,485,784	I. 3,509,619
Briquets made,	7,097,135	8,189,944	I. 1,092,809

The larger part of the briquets are made of lignite, or brown coal.

Iron Trade Review.

New York, Sept. 19.

The great rush to buy which we have noted for the last few weeks has quieted down and pig-iron sales are gradually reverting to a more normal condition. Large consumers are generally well supplied for the time, but there is a considerable small element on the market which needs iron for short deliveries. These are difficult to find, and in many cases they have to supply their wants from second-hands, or from speculators, at prices above the market. The quantity of such iron, however, is not very large. Furnaces are practically sold up to the end of the year, and many of them well into 1907. Still, it seems probable that all parties will finally be supplied.

Finished material is also quieter, as far as new business is concerned. While there is a good deal of structural work still planned and ready to come on the market, there is nothing of a pressing character. The nearest approach to such work is the large quantity of new bridge work which is planned by Eastern railroads. In some cases this work has been postponed on account of the difficulty in securing material. We are informed that this is the case notably with the Boston & Maine, which had planned to replace a number of its old wooden bridges this year, but has put the work over until next.

The iron-ore movement from the Lake Superior region continues to be pushed as fast as possible. It is evident, however, that unless the Lakes are open to an unusually late date, the total movement will be much less than had been expected and planned early in the year.

Pig Iron Production—The monthly statement of the blast furnaces shows that on Sept. 1 there were 301 coke and anthracite furnaces in blast, having a total weekly capacity of 441,500 tons; a decrease of 8500 tons as compared with Aug. 1. Taking the estimate of the *Iron Age* for coke and anthracite furnaces and making an allowance for the charcoal furnaces, the production of pig iron in August was about 1,957,500 tons, making a total for the eight months ending Aug. 31 of 16,607,400 tons.

Birmingham. Sept. 17.

The scarcity of spot iron has been noted heretofore, and fancy prices prevail. The furnace companies in this district are still receiving orders for iron delivery during the first half of the coming year. But few, if any of them, are in a position to sell iron for delivery this year. Regular customers are being assisted as much as possible, and some of the short but urgent needs have been supplied. Absolutely no iron is going to the yards around the furnaces. More than one company is out of the market on business before April. The production in the Birmingham district is a little better than a fortnight since. Two furnaces have been started up. There is a little scarcity of raw material, coke and ore, in this district, and this is giving some concern. Efforts are being made to increase the output at the ore mines, and also at the coke ovens.

Fancy-price iron is not being sold in great quantity. Charcoal iron is finding a steady demand now, $22 per ton being quoted for this product. The Quinn charcoal furnace at Gadsden will be in full operation by the end of the week.

The Southern Steel Company will maintain headquarters in Birmingham, offices having been leased in the Brown-Marx building in this city. The work of concentrating operations of the old company and the two iron companies absorbed is well in hand.

Chicago. Sept. 17.

A quiet but firm iron market continues. Most of the business done is on the basis of deliveries in the first and second quarters of 1907, with contracts for previous delivery diminishing in character, though drawing a premium of 25@75c., and confined to the remaining portion of the calendar year. There is no diminution of the market's requirements apparent, but rather an increasing appreciation by melters of the needs of the coming year.

The lively demand for deliveries before Jan. 1 is due chiefly to the fact that the business of melters is running beyond their original contract requirements. With no expansion of business old contracts could be fulfilled, and new ones undertaken on the strength of stable conditions. But the pig-iron market will not remain stable. Its movements are erratic, and consequently there is a rush to cover now.

Quotations are unchanged, being for general sales $20 for Northern No. 2 and $15.50 Birmingham for Southern No. 2 ($19.15 Chicago).

There is a good deal of complaint about car service, but as yet it does not seem to affect the market generally.

Cleveland. Sept. 18.

Iron Ore—Since the furnace interests are not so much pushed by a buying demand just now, they have eased their pressure on the ore producers. No sales of ore for next year have been made, and it is possible that this matter will be postponed until the normal time which comes a month and a half to two months from now. The ore-carrying rates have not changed.

Pig Iron—Buying in foundry grades has been lighter during the past week, and the furnace interests are easing up prices. They are willing to sell foundry No. 2 at $20 for delivery during the remainder of this year, while first-class material is selling at $18.50 in the Valleys. Bessemer is selling for spot shipment at $18.50 and on contract at $18.25. The same is true of basic. Southern No. 2 is offered in this territory at $15.50 Birmingham.

Finished Material—Five new boats have been ordered on the Lakes during the past week, which increases the demand for plates and shapes. Bar iron is much stronger, largely due to the high price of scrap. It is selling at 1.70c. Pittsburg. Sheets are stronger. Forging billets are almost off the market, being sold in small quantities at $25@26 at mill.

New York. Sept. 12.

Pig Iron—The market is strong, but buying is less active. Large consumers are supplied, apparently, and the present demand is chiefly for small lots. Prices are nominally unchanged, depending chiefly on deliveries wanted; in many cases premiums are paid.

Current quotations for pig iron are for New York or parallel delivery:

Northern:	
No. 1 X foundry	$20.25@20.75
No. 2 X foundry	19.25@20.25
No. 2 plain	18.75@19.75
Forge pig	17@18
Southern:	
No. 1 foundry	19.50@20.50
No. 2 foundry	19@20
No. 3 foundry	18.50@19.50
No. 4 foundry	18@18.50
No. 1 soft	19.50@20.50
No. 2 soft	19@20
Gray forge	17@17.50
Basic pig:	
Northern	18.75@19.25
Virginia	18.60@19.10
Alabama	

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—Bars are steady and unchanged at 1.695c. tidewater for common iron, and 1.745c. for refined. Steel bars are quoted 1.745c. Store trade is good, at 2.50c. delivered.

Structural Material—Demand is less pressing, though there are still many new buildings forward. Prices nominally unchanged.

Rails—Standard rails are unchanged and contracts are being taken only for next year. Light rails are in good demand.

Philadelphia. Sept. 19.

Pig Iron—This has been a week for the small consumers of iron, with the exception of basic, which is still very active, and negotiations are now under way for large quantities. The situation is by no means improved by the falling off in production, due to a number of causes and to the rumor of a heavier drop in output, which it is predicted will take place when coke advances a little more. The upward tendency in coke is one of the most discouraging features, but some of our people believe that the anticipated dangers are over-estimated. The tone of the market is strong and the small buyers are quite busy in securing supplies, some of them for early delivery, but more of them for winter. There is an undertone of a speculative nature, which is not at all healthy and which, if it is not curbed, will do some harm. Quotations today are irregular on account of the offerings of premiums, which make any quotations that may be given unreliable, but the nearest that can be fairly quoted are $22@22.50 for No. 1 X foundry; $21 for No. 2 X foundry; $20 for No. 2 plain; $18 for standard forge; $18.50 for basic; $25 for low phosphorus.

Steel Billets—The billet situation has not cleared up as was expected a month ago. Prices have advanced and a fair quotation may be given at $30.50@31.50 for ordinary billets and $38 for forging billets, though a lower figure has been quoted.

Bars—Steel bars continue to be the most active and our mills are oversold with prospects of not catching up for a good while to come.

Sheets—There is a rumor today that urgent buyers of sheet iron are willingly paying something above the card rates, though the card remains nominally as it has been.

Pipes and Tubes—The consumption of tubes continues heavy, and the orders that are being sent to the mills betoken an anxiety upon the part of consumers to have a sufficient supply of stock on hand.

Merchant Steel—There is a fair demand for the kinds of merchant steel in this territory and prices are strong.

Plate—The plate mills have been called upon to bid upon large quantities of plate and small shapes for car-building purposes. Boiler plate is in active demand.

Scrap—The scrap market continues to be in an excited condition, particularly with reference to first-class scrap. Prices are held very firmly at $21.50 for railroad scrap; $18 for No. 1 steel scrap; $19 for No. 1 yard; $17.50 for machinery scrap; and $23 for low phosphorus scrap when it can be had.

Pittsburg. Sept. 18.

The iron and steel market is comparatively quiet all along the line. In pig iron there is little buying for forward delivery, while there is less movement in prompt material, consumers being better supplied. In finished-steel lines, specifications on old contracts continue heavy, but are not as heavy as they were in August. Production is larger and in some lines mills are gaining on their order books while in others the current bookings still exceed the current output.

The whole market is wound up to the end of the year and probably well into next year. While the business now on books is being filled, a period of steadiness is assured, without any definite trend of the markets in either direction. Altogether the situation is regarded by producers as the most satisfactory which has been witnessed for a long time.

The local rail mill is sold up for all of this year on standard rails and with tonnage which will have to be carried over, has business on its books for three or four months' operations next year. In light rails business has been good, a large tonnage being booked, despite the fact that the local mill cannot promise delivery in less than from 12 to 15 weeks. The smaller orders, for quick delivery, are going to the re-rolling mills.

The annual convention of the American Boiler Makers' Association opened this morning, and steel men, particularly the representatives of the plate mills, are meeting many of their customers.

Pig Iron—The market has been quiet as regards steel-making pig, while in foundry pig, sales of small lots for early shipment have continued at premiums, although the total turnover per week is less than it was late in August. Several sales of small lots of bessemer and basic have been made in the past 10 days at $18.75, Valley, for bessemer and $18.50, Valley, for basic, for delivery in fourth quarter of this year and also for first and second quarters of next year, the market being well established at these figures. Prompt lots of Northern foundry iron have brought as high as $20, Valley, the market for next year's delivery remaining at about $18, Valley, or $18.85, Pittsburg. Southern iron can be had at $15, Birmingham, for delivery next year, while deliveries this year are bringing $15.50@16, Birmingham, equal to $20.10@20.60, Pittsburg. Very little of this iron is now coming to the Pittsburg district as consumers are getting better deliveries from Northern furnaces. Forge is $17.25@17.50, Valley, or $18.10@18.35, Pittsburg.

Steel—The supply of both billets and sheet-bars is slightly better. Some inquiry is developing for next year, from

consumers who have contracts expiring with this year. Slightly lower prices are quoted on billets and sheet-bars for first quarter than prevail for earlier delivery. We quote bessemer billets at $28@29, open-hearth billets, $29@30 and sheet-bars at $30, for nearer delivery.

Sheets—No change in prices has been made and there is less expectation that there will be any advance. Blue annealed sheets are strong, and bringing 1.75c. for No. 10 gage. Box annealed sheets, one pass cold-rolled, are 2.50c. for black and 3.55c. for galvanized, 28 gage.

Ferro-manganese—Imports of ferro-manganese in the second quarter of this year amounted to 21,220 gross tons, or 50 per cent. increase over the first quarter, while spiegel imports were 26,579 gross tons, showing a decrease of a few hundred tons. The imports are at a much heavier rate than in previous years, but the scarcity continues, as demand is so much heavier. We quote imported 80 per cent. ferro-manganese at $90 for prompt and $85 for future delivery.

London. Sept. 7.

The British Iron Trade Association, which received returns from makers, reports the total output of pig iron in Great Britain for the first half of 1906 at 4,905,424 tons, which is an increase of 283,824 tons over the first half of 1905. Most of the principal districts showed an increase, which was especially marked in the Scotland and the Cleveland districts. In South Wales the change was not large. The following table gives the make of pig iron of different descriptions in the first half of the years 1905 and 1906 in long tons:

	1905.	1906.	Changes
Forge and foundry...	1 968,445	2,148,273	I. 179,828
Hematite.....	1,999,290	2,009,276	I. 9,986
Basic.....	567,476	630,660	I. 63,184
Spiegeleisen, etc.....	86,389	117,215	I. 30,826
Total.....	4,621,600	4,905,424	I. 283 824

Hematite iron in the British classification is equivalent to our bessemer pig. The total increase was 6.1 per cent. this year. The total number of furnaces in existence at the close of the year was 515. The average number in blast during the half year was 363⅓. The average output per furnace this year was, therefore, 13,501 tons. This average varied considerably in the different districts, however, the lowest reported being 6859 tons in Derbyshire, and the highest 22,889 tons in South Wales. This was followed closely by 21,674 tons in the Cleveland district, and 20,411 tons in West Cumberland.

Cartagena, Spain. Sept. 1.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report shipments for the week one cargo, 2500 tons manganiferous, and two cargoes, 5050 tons dry ore, all to Great Britain. The market is strong, but shipments are limited by scarcity of tonnage.

Prices are 8s. 10d.@9s. 1d. per ton for ordinary 50 per cent. ore; 9s. 4d.@9s. 7d. for special low phosphorus; 10s. 9d. for S P. Campanil; 12s. 1d. for specular ore, 58 per cent. Manganiferous ores range from 12s. 9d. for 35 per cent. iron and 12 manganese, up to 15s. for 25 per cent. iron and 17 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, is quoted at 10s. 8d. per ton.

Chemicals.

New York, Sept. 19.

Copper Sulphate—Demand is good and prices have a tendency to advance, as copper prices go up.

Heavy Chemicals—Joseph P. Brunner & Co., writing from Liverpool under date of Sept. 5, state that the market for heavy chemicals continues fairly active and is in a healthy condition. Soda salts (ash, crystals, caustic and bicarbonate) are all in good demand, with bleaching powder, sulphate of ammonia and chlorate of potash less active.

Nitrate of Soda—There is no material change here. Joseph P. Brunner & Co. report from Liverpool that nitrate is strongly held and in view of the high prices for future delivery sellers are asking £11 10s. for ordinary and £12 per ton for refined in double bags, f.o.b. Liverpool, and subject to a discount of 2½ per cent.

Jackson Bros, report from Valparaiso, Chile, under date of Aug. 4, that the market is continuing very active with 95 per cent., delivery this year, selling from 8s. 10d. to 9s. 3d. Several sellers offered their production at the last named figure, but found no takers at that price. For future delivery business has been fairly active, and 8s. 4¼d. has been realized for April to December, 1907, delivery, with 1908 at 8s. 2d. Some orders have been booked for 1909 and 1910 at 7s. 10d. The 95 per cent. is quoted at 9s. 3d. for 1906, and 8s. 5d. for 1907 with 96 per cent., immediate delivery, at 2d. higher. The above figures refer to the price per quintal.

Metal Market.

New York, Sept. 19.

Gold and Silver Exports and Imports.
At all United States Ports in August and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1906..	$ 598,078	$7,935,928	Imp $7,337,850
" 1905 .	274,153	3 213 216	" 2,939,063
Year 1906..	33,512,040	80,308.039	" 46,795,999
" 1905..	41,265.017	24,795.910	Exp. 16,469,107
Silver:			
Aug. 1906 ..	4,049 173	2,738,951	" 1,310,222
" 1905 ..	4,549,485	2,517.274	" 2,032,211
Year 1906 ..	41.847,028	29 693,485	" 12,153,543
" 1905 ..	33 915,751	20,666.993	" 13,248,758

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York
For week ending Sept. 15 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 12,000	$3,046,429	$ 713,503	$ 18,400
1906.....	5,964,743	52,645,856	41,116,414	1,511,062
1905.....	32,285,443	1,409,332	24,300,468	3,133,482
1904.....	72,934,064	3,853,899	28,240,522	665,431

The heavy imports of gold for the week, this year, is due to the order of the Secretary of the Treasury facilitating imports The larger part of the supply came from London; the silver all came from Mexico. All the gold exported was for Mexico and most of the silver was to London.

The foreign trade of the United States is valued as below, for the eight months ending Aug. 31, by the Bureau of Statistics of the Department of Commerce and Labor:

	1905.	1906.
Exports.....	$966,567,559	$1,098,994,662
Imports.....	770,285,198	845,540,383
Excess, exports...	$196,282,361	$253,454,279
Add excess of exports, silver....		12,153,543
Total.....		$265,607,822
Deduct excess of imports, gold..		46,795,999
Net export balance.....		$218,811,823

The gold and silver movement in detail will be found in the table above.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Sept. 15 gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	$1,085,821,900	$1,036,460,400
Deposits.....	1,096,353,200	1,005,487,600
Circulation.....	53,696,500	44,888,800
Specie	202,175,200	177,366,500
Legal tenders.....	76,548,400	77,541,800
Total reserve.....	$278,723,600	$254,908,300
Legal requirements....	274,088,300	251,371,900
Surplus reserve.....	$4,635,300	$3,536,400

The principal changes for the week this year were an increase of $8,024,900 in specie, and the improvement in the reserve from a deficit of $6,577,925 to a surplus of $3,536,400 this week.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....	.....	.....	$177,366,500
England.....	$175,228,530	.....	175,228,530
France.....	584,058,710	$209,469,860	793,528,570
Germany.....	160,210,000	53,400,000	213,610,000
Spain.....	76,245,000	123,335,000	199,580,000
Netherlands....	27,640,000	28,472,500	56,112,500
Belgium.....	17,546,665	8,773,335	26,320,000
Italy.....	149,055,000	19,276,000	168,331,000
Russia.....	554,445,000	29,710,000	584,155,000
Austria.....	233,955,000	60,030,000	293,985,000
Sweden.....	19,400,000	.....	19,400,000

The returns of the associated banks of New York are of date Sept. 15, and the others Sept. 14. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Exports of silver from London to the East are given by Messrs. Pixley & Abell's circular as follows, for the year to Sept. 6:

	1905.	1906.	Changes.
India.....	£ 4,243,371	£ 11,872,043	I. £ 7,628,672
China.....	753.841	280,700	D. 473,141
Straits..	2,800	1,750	D. 1,050
Total.....	£ 5 000,012	£ 12,154,493	I. £ 7,054.481

Imports for the week ending Sept. 5 were £4000 from New Zealand, and £248,000 from New York; a total of £252,000. Exports were £112,500, all to India.

Indian exchange has been steady, although money is now plentiful in India. All the Council bills offered in London were taken at 16.06d. per rupee. Silver is in steady demand for India, notwithstanding the high price; and some silver has also been bought for Chinese account in London.

The silver market continues steady, with a good general demand for the metal, and prices are maintained at a high level.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.52¾	$0.55
Peruvian soles and Chilean	0.48	0.51½
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
13	4.83¾	67⅞	31 1/16	17	4.83¾	67⅝	31 1/16
14	4.83¾	67⅞	31 1/16	18	4.83¾	67⅝	31 1/16
15	4.83¾	67⅞	31 1/16	19	4.83¾	68	31½

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Sept.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
13	19 @19¼	18¾ @19	86¾	40¼	5.75	6.20 @6.25	6.05 @6.10
14	19 @19¼	18¾ @19	86¾	40	5.75	6.20 @6.25	6.05 @6.10
15	19 @19¼	18¾ @19 1/16	.....	40	5.75	6.25 @6.30	6.10 @6.15
17	19⅛ @19⅜	18 15/16 @19⅛	87⅛	39¾	5.75	6.30	6.15
18	19⅛ @19⅜	18 15/16 @19⅛	87 13/16 @40	39¾	5.75	6.30 @6.35	6.15 @6.20
19	19⅛ @19⅜	18 15/16 @19⅛	88	39¾ @40	5.75	6.30 @6.35	6.15 @6.20

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The tentative inquiries for next year's delivery, of which there were reports last week, have crystallized into a very large business for that shipment. Consumers are alive to the fact that present production in inadequate to meet their requirements and there is an inclination to cover as far ahead as possible. Business for export continues on a very satisfactory scale. The close is strong at an advance, Lake copper being quoted at 19⅛ @19⅜; electrolytic in ingots, cakes and wirebars at 18 15/16@19⅛; while 18⅝@ 18⅞ represents the average at which business was done in casting copper during the past week.

The bears of three months ago are being taught a lesson in the London standard market, which has had a gradual and well sustained advance, closing firm at £88 for spot, £88 2s. 6d. for three months.

Statistics for the first half of the current month show an increase of 300 tons in the visible supplies.

Refined and manufactured sorts we quote: English tough, £90 10s.@£91 10s. best selected, £91 10s.@£92 10s.; strong sheets, £97@98.

Copper exports for the week from New York and Philadelphia were 2756 tons. Our special correspondent reports exports from Baltimore at 135 long tons.

Tin—This metal has been rather neglected. Speculators consider it too high to risk ventures on the bull side of the market, while, on the other hand, they do not care to risk short sales in view of the general sound condition of the market. Consumers' purchases have been of a hand-to-mouth character. Quotations at the close are 39¾@40c.

The London market has fluctuated within narrow limits during the entire week. The close is steady at £184 for spot, £181 10s. for three months.

Lead—There has been no change in the market on this side, prices continuing at 5.75c. New York, but in London the advance has made further progress, and the close is cabled as £18 10s. for Spanish lead, £18 11s. 3d. for English lead.

The movement of foreign lead in the United States for the seven months ending July 31 is reported as below, in short tons:

In bond, Jan. 1	8,148
Imports, seven months	55,636
Total supplies	63,784
Re-exports, seven months	29,074
In bond, July 31	7,356
Total deduction	36,430
Balance	27,354

The balance has, presumably, entered into consumption in this country.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us as follows on Sept. 19: Lead is strong, and Missouri brands are selling at 5.85@6c., according to brands and deliveries.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 1, that the market has been strong. Pig lead has been 81.25 reales per quintal, silver being paid for at 13.75 reales per ounce. Exchange is 27.98 pesetas to £1. The price of lead is equivalent to £16 5s. 2d. per long ton, f.o.b. Cartagena. Exports for the week were 172 tons argentiferous and 164 tons desilverized to Marseilles; 406 tons argentiferous and 500 tons desilverized to Great Britain.

Spelter—Under very heavy inquiry, this metal has been advancing from day to day. Supplies in first hands are reported to be very small, while consumption is on an unprecedentedly large scale. The close is firm at 6.15@6.20 St. Louis, 6.30@6.35c. New York.

There has been no change in the London market, which is quoted at the close at £27 10s. for good ordinaries, £27 15s. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 1, that little new business is doing. Shipments for the week were 950 tons blende and calamine to Antwerp; 830 tons blende to Swansea.

Antimony—A retail business is doing from day to day at 21½@22½c. for ordinary brands and 24@25c. for specials.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—No further advance is reported since two weeks ago when the price rose sharply to $33 per oz. unmanufactured and $24 for scrap metal. It is impossible to predict future prices, but dealers look for little or no recession from present quotations for some time to come.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 per flask, while jobbers are asking £16 18s. 9d.

Aluminum—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Missouri Ore Market.

JOPLIN, Sept. 15.

The highest price reported paid for zinc ore was $46 per ton, a decrease of $2 per ton. The assay basis price ranged from

$44 down to $41 per ton of 60 per cent. zinc, with the bulk of the sales at $42 to $43 basis. The average price of the week was $41.50 per ton.

The highest price of lead was $82.50, with medium grades strong at $80@81.50. The average price of all grades was $79.50 per ton.

The burning of the Lanyon Zinc Company's Iola smelting plant put that company out of the market for zinc this week, and the purchasing agents of other smelters took advantage of this to offer lower prices. With spelter advancing, owing to a decreased production, some producers declined to accept the lower offerings for zinc ore. With the Lanyon out of the market, decreasing the demand approximately 800 tons per week, some producers holding their ore, and a lack of cars in some quarters, the zinc shipment of the week is 672 tons less than the previous week. Outputting conditions are at the best and the stock on hand now exceeds 3500 tons, a point at which smelters consider that the market is under their control.

Following are the shipments of zinc and lead ores from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,181,710	590,480	$ 70,525
Joplin	2,523,430	198,410	63,451
Galena-Empire	710,730	202,490	22,618
Duenweg	599,020	115,270	17,488
Badger	670,650	8,120	15,414
Alba	625,930	.....	14,083
Prosperity	223,910	134,080	10,161
Granby	490,000	25,000	9,500
Aurora	476,990	.....	7,472
Spurgeon	446,750	34 460	7,258
Baxter Springs	258,950	102,520	9,279
Oronogo	257,310	9,120	6,068
Carthage	169,820	.....	3,820
Neck City	160,920	.....	3,620
Sherwood	161,560	14,860	3,051
Zincite	76,040	.....	1,635
Stott City	39,810	.....	856
Totals	10,073,530	1.434,810	$266,279
37 weeks	390,968,320	54,465,310	$10,564,438

Zinc value, the week, $209,088; 37 weeks, $8,483,977.
Lead value, the week, 57,191; 37 weeks, 2,080,461.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58 27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	....	September	63.50	....
October	47.60	....	October	63 86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Sept. 15.

The impetus caused several weeks ago by the advent of the Mineral Point Zinc Company as a buyer still continues. Nearly every mine in the district reports an improvement in local conditions, and a better price for ore. Few of the larger mines were idle during the week, although it took some of them until Tuesday to get started again after the shut-down during the county fair at Platteville. Fine weather aided producers and a big shipment is reported in consequence. There was some effort on the part of one buyer to stem the rising prices, but as far as reported he did not cut much figure. The larger part of the ore sold was bought at about the same price as last week.

The camps of the Platteville district loaded ore as follows for the week ending Sept. 15:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	322,170	.....	.....
Buncombe & Hazel Green	371,400	38,000	.....
Benton	334,000	.....	.....
Highland	319,150	60,000	.....
Mineral Point	271,700	.....	.....
Cuba City	154,000	.....	.....
Linden	131 960	.....	.....
Rewey	127,500	.....	.....
Livingston	51,200	.....	.....
Galena	42,500	.....	.....
Dodgeville	42,180	.....	.....
Total for week	2,167,760	98,000	.....
Year to Sept. 16	51,543,886	2,554,550	2,840,110

The hopeful situation remarked some time ago is accounted for in many ways. The important factor is the actual finding of ore in many places by the drills earlier in the summer. The tendency heretofore has been to cover up the possibilities of the district. Local mining men now realize the advantages of the experience to be gained from outside mining men. There is no doubt that communication between the Joplin and Wisconsin zincfields has had much to do with sustaining present prices.

Mining Stocks.

NEW YORK, Sept. 19.

The stock markets this week have been generally active, with a tendency to advance, notwithstanding some hardening in rates for money. The market, however, still continues to be a professional one, and is handled chiefly in the interest of the large operators.

The iron and industrial stocks were generally strong. United States Steel closed at $46 for the common and $107 for the preferred; American Smelting at $155½ for the common; and Amalgamated Copper at $114½. In the curb market mining stocks were largely dealt in at good prices. Butte Coalition sold up to $38½, and Nevada Consolidated to $19. Furnace Creek made large sales today at $4¾. The chief sensation was Nipissing mines—the Cobalt company—which was heavily bought, running up to $16, but closing at $15½ per share.

On the Consolidated Exchange sales were noted of Tonopah Extension at $5.25; Jim Butler at $1.42; Montgomery Mountain at 57c. Little was done in the Comstocks, 85c. being paid for Best & Belcher, and $1.05 for Hale & Norcross.

Boston. Sept. 18.

The action of copper shares the past week suggests a genuine copper boom and reminds one of old times. Many new price records were scored during the week, and from all indications, still higher prices will be seen. As has been remarked many times, conditions are favorable for higher prices in these stocks and all that was needed was an initiative. This came last week in the way of support from New York. The copper interests there sent some $3,000,000 to this city to be used for market purposes.

Amalgamated touched $115.37½ Monday, closing at $114.62½ tonight, against $110.75 a week back. There is strong talk that the next dividend will be increased as well as that of Anaconda. The latter, which is very seldom quoted in this market, sold up to $72 per share. The floating stock is said to be limited. North Butte made a new high record at $100.25, dividend on. It touched $99.87½ ex-dividend today. Butte Coalition had a $5.75 rise to $39.12½ on extra large dealings. English interests have taken large interests in this stock, it is reported. Greene Consolidated took a sudden spurt and touched $29.12½ today, which is almost a $4 advance for the week. It comes from Michigan that T. P. Cole and James Hoatson will become directors of the Greene.

Bingham Consolidated is up $6 to $36.50. Calumet & Hecla is up $37 for the week to $772. Osceola boomed $6 to $112.50, with some reaction, and Tamarack touched $100. Quincy advanced $10 to $97 and Utah Consolidated $4.12½ to $66.50. Calumet & Arizona is up $4 to $121.50 and Old Dominion boomed $6.62½ to $48.75 on very heavy dealings late last week. Shannon became active upon the return of N. L. Amster from Europe, Saturday. Mr. Amster claims that he and his associates will control the next Shannon annual meeting. The stock is up $2.25 to $10.87½. Arbitrage houses started the movement in Boston Consolidated which caused the stock to sell up $3.75 to $32.50. Daly-West rose $2.75 to $18.75 on Salt Lake buying.

Copper Range was a late comer in the movement, but rose $3.75 to $80.75, with over $1 reaction.

Superior & Pittsburg and Nipissing have been the curb features. The former is up $3 to $19.50, and the latter $7.25 to $16.25. Arizona Commercial recovered to $42 on the curb. Cananea Central touched $19.50 and Ahmeek $85.50 per share.

Colorado Springs. Sept. 14.

The market in Cripple Creek shares on the Colorado Springs exchange has been in just normal condition all the past week and prices have held practically stationary. Portland, which made such a rapid decline the week before, gained 4c. to $1.20. There were no especial features.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 18

Name of Company.	High	Low	Clg.	Sales
Amalgamated*	115⅜	110	115⅜	679,350
Anaconda*	292½	276½	292½	225,350
British Col. Copper	10⅞	10⅛	10¾	12,700
Butte Coalition*	39⅛	33½	37⅜	13,700
Cum. Ely Mining	10	9⅛	10	4,600
Greene Gold	2⅛	2	2¼	340
Greene Gold & Silver	2⅛	1⅞	2⅛	3,200
Guanajuato	5⅜	5¼	5⅜	700
Micmac	5½	5	5¾	8,400
Mines Co. of Am	1.22	1.20	1.22	7,000
Mitchell Mining	5½	4¾	5	7,305
Mont. Sho. Con. (New)	13½	12	13	2,610
Nev. Utah M. & S.	4½	3⅞	4⅜	11,800
Nipissing Mines	16	9	16	133,900
Tennessee Copper	45	43	45	2,425
Union Copper	1⅛	1¼	1 7/8	9,700
Utah Apex	7⅛	7¼	7⅛	200

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	157¼	151¾	156	152,150
Am. Smelt. & Ref., Pf.	117⅞	115⅝	115½	4,669
Bethlehem Steel	24¾	24¾	24¾	100
Colo. Fuel & Iron	58¾	56¾	58⅞	36,400
Federal M. & S., Pf.*	94¾	92	94	800
Inter. Salt*	41	34⅜	40⅜	4,740
National Lead	80¾	78	79	20,400
National Lead, Pf	102¾	101½	101½	700
Pittsburg Coal	14⅜	14⅛	14⅜	100
Republic I. & S.	39	36	39	45,000
Republic I. & S., Pf.	103¼	99	100	10,450
Sloss-Sheffield	80	76½	78½	6,200
Tenn. C. & I.				
U. S. Red. & Ref				
U. S. Red. & Ref., Pf.	74½	73¼	74¼	300
U. S. Steel	47⅛	45½	46⅛	445,350
U. S. Steel, Pf.	107⅝	106⅛	106⅝	34,075
Va. Car. Chem	42	39¾	42	9,825

BOSTON.

Adventure	6¼	6	6	855
Alloues	39	37½	37½	3,130
Atlantic	13	12	12⅜	815
Bingham	36⅜	30½	36¾	21,395
Boston Consolidated	32⅛	29	32⅛	12,956
Calumet & Arizona*	121⅛	117¼	121⅛	2,482
Calumet & Hecla*	775	735	772	150
Centennial	25½	23	25½	3,280
Copper Range	80¾	76	80¾	20,505
Daly-West	18¾	16	18¾	114,009
Franklin	22½	21	21¾	9,966
Granby*	12¾	12	12¾	1,895
Greene Consolidated*	29½	24¾	29½	19,880
Isle Royal	23¾	19¾	23¾	13,115
Mass	9⅛	8	9⅛	2,535
Michigan	15¾	13½	15¾	3,245
Mohawk	64¾	60½	64¾	1,576
Mont. Coal & Coke rcts.	2⅞	2⅝	2⅞	60
Nevada	19¾	17¾	19¾	5,230
North Butte	100¾	94	99¾	43,167
Old Dominion	48¾	42	48¾	22,228
Osceola	122½	116	122½	5,381
Parrot*	29	25	29	3,286
Quincy*	97	87	97	687
Rhode Island	5⅜	5	5⅜	1,505
Shannon	10⅞	9¼	10⅞	12,760
Tamarack	100	98	100	143
Tecumseh	13¾	11¼	13¾	3,595
Trinity	13¾	9⅞	13¾	12,019
United Copper, com.	67	62½	66¾	4,772
U. S. Oil	11	9⅞	11	2,200
U. S. Smg. & Ref.	63	61	62¾	9,143
U. S. Smg. & Ref., pfd.	47½	46⅜	47⅜	4,531
Utah Copper	66⅜	62	66⅜	18,259
Victoria	7⅛	7	7	665
Winona	8⅛	8	8⅛	2,105
Wolverine	160	149	151	530
Wyandotte	1.50	1.00	1.50	930

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 29½—28; Comstock, .19—.19; Davis-Daly Est., 10¾—10⅛; Gold Hill, 3—2¾; Gugg. Exp., 284—278; Rich. Eureka, 8¼—7½; Standard Oil, 606—600. (Boston) Ahmeek, 85—81; Am. Zinc, 14½—12; Arcadian, 4—3½; Ariz. Com'l, 40½—37½; Black Mt., 8—8; Cananea, 17¾—16¾; East Butte, 10—9; Keweenaw, 10½—10¼; Majestic, 1⅝—1⅛; Raven, .87—.81; Shawmut, .90—.80; Superior Cop., 15; Superior & Pitts., 17¾—16¼; Troy, 1⅝—1½.

PHILADELPHIA. Sept. 18.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7	6½	7	452
Cambria Steel	39⅛	37¾	38⅛	11,998
General Asphalt	8¼	8¼	8¼	3
Penn. Steel, pd.	106½	106½	106½	100
Philadelphia Co.	49¾	48¼	48½	31
Tonopah Mining	18¾	18	18	530

PITTSBURG. Sept. 18.

Crucible Steel	13⅛	12⅜	12⅝	1 900
Crucible Steel, Pf.	82	80¾	81	655
Harbison-Walker Ref.	13	13	13	130
Ohio Tonopah	.26	.25	.25	6,150
Tonopah Ext.	5⅛	5¼	5⅜	1,100

COLORADO SPRINGS. Sept. 15.

Name of Company.	High	Low	Clg	Sales
Acacia	14	12½	12½	19,000
Dante	5⅛	5	5	4 000
C. C. Con	6⅛	6¼	6½	
Doctor Jack Pot	9¼	8⅜	8⅜	
Elkton	49	48	48½	18 200
El Paso	53	51	52	7,600
Findley	75	73½	74	5,600
Gold Dollar	8¼	7⅞	7⅞	10,350
Gold Sovereign	7	7	7	5,000
Isabella	20½	19¼	20	18 700
Jennie Sample	9½	9¼	9¼	27,000
Mary McKinney	70	65	65	4,550
Portland	1.20	1.16	1.20	18,900
United Gold Mines	9½	7⅜	9⅜	
Vindicator	95	94	94	900
Work	17	16¾	17	30,000

SAN FRANCISCO. Sept 11.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.97	.85	.90	600
Caledonia	.28	.26	.25	1,400
Challar	.13	.09	.09	5,500
Con. Cal. & Va	.93	.82	.85	4 450
Crown Point	.08	.05	.06	600
Gould & Curry	.19	.16	.17	6,200
Hale & Norcross	1.00	.90	.95	300
Mexican	.88	.69	.70	2,200
Ophir	3.45	3.05	2.90	1,950
Overman	.10	.09	.10	400
Potosi	.12	.11	.12	1,700
Savage	.92	.91	.92	
Sierra Nevada	.28	.17	.26	2,920
Bullfrog Mining	.48	.45	.48	30,500
Diamondfield	.39	.35	.35	21,000
Goldfield of Nevada	.67	.58	.66	12,250
Jim Butler	1.45	1.27	1.27	4,500
Jumping Jack	.51	.47	.51	73,500
Kendall	.72	.67	.70	2,500
MacNamara	.75	.70	.70	11,100
Manhattan Dexter	.65	.60	.60	4,800
North Star	48	.45	.45	5,400
Original Bullfrog	.16	.13	.14	26,400
Tonopah Belmont	5.25	5.12	5.25	2,110

Tonopah Stocks. Sept. 19.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18.25	18.00	18.25
Tonopah Montana	2 92	2 90	2 90
Tonopah Extension	5 62½	5.50	5.50
Tonopah Midway	2.34	2.30	2.32
Tonopah West End	2.80	2.75	2.80
Goldfield Mining Co.	.71	.70	.70
Jumbo Mining	1.42	1.37	1.40
Red Top	1.56	1.52	1.54
Sandstorm	.72	.69	.70
Montgomery Shoshone Cons	13.25	13.00	13.00

St. Louis. Sept. 15.

Adams, $0.40—$0.25; American Nettie, $0.08—$0.07; Center Creek, $2.40—$2.10; Central Coal and Coke, $64.25—$63.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$58.00; Columbia, $4.00—$3.80; Con. Coal, $25.00—$23.50; Doe Run (old stock), $350.00—$300.00; Granite Bimetallic, $0.25—$0.22; St. Joe (old stock), $32.00—$30.00.

LONDON. *(By Cable.*)* Sept. 19.

Dolores, £1 12s. 6d.; Stratton's Independence, £0 4s. 0d.; Camp Bird, £1 6s. 6d.; Esperanza, £3 0s. 0d.; Tomboy, £1 8s. 1¼d.; El Oro, £1 8s. 9d.; Oroville, £0 19s. 3d.; Somera, £0 6s. 3d.; Utah Apex, £1 10s. 0d.; Ariz. Copper, pref., £3 9s. 9d.; Ariz. Copper, def., £3 8s. 3d.

*Furnished by Hayden, Stone & Co., New York.

New Dividends.

Company.	Payable.	Rate.	Amt.
Am. Smg. & Ref. Co., Com.	Oct. 15	$1.75	$875,000
Am. Smg. & Ref. Co., Pfd.	Oct. 1	1.75	875,000
Bingham & New Haven	Sept. 15	0.10	22,600
Bunker Hill & Sullivan	Sept. 6	0.60	180,000
Crucible Steel, Pfd.	Sept. 29	1.50	375,000
Homestake	Sept. 25	0.50	109,200
Horn Silver	Sept. 29	0.05	20,000
N. Y. & Hond. Ros.	Sept. 22	0.30	45,000
Republic Iron & St., pfd.	Oct. 1	3.75	765,634
Sloss. Sheff. Com.	Oct. 1	2.50	187,500
Sloss Sheff. Pfd.	Oct. 1	1.75	127,250
Va. Car. Chem. Pfd.	Oct. 15	2.00	360,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Andes Silver Mg., Nev.	Oct. 5	Oct. 26	$0.10
Black Diamond, Utah	Sept. 15	Oct. 6	0.01
Bullion G. & S., Nev.	Oct. 8	Oct. 31	0.05
Lower Mammoth, Utah	Sept. 15	Oct. 4	0.05
Sierra Nevada, Nev.	Sept. 12	Oct. 4	0.10
West Quincy, Utah	Sept. 7	Sept. 27	0.10

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.419	68.262	78 896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March.	15.125	18.361	15.250	18.641	68.174	81.111
April.	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June.	14.673	18.442	14.813	18.719	65.881	83.994
July.	14.888	18.190	15.005	18.585	66.887	81.167
Aug.	15.664	18.380	15.725	18.706	69.830	83.864
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	37.275
Feb.	29.262	36.403	August	32.866	40.606
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	.....
June	30.329	39.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	5.750
Feb.	4.450	5.464	Aug.	4.665	5.750
March	4.470	5.350	Sept.	4.850	.....
April	4.500	5.404	Oct.	4.850	.....
May	4.500	5.685	Nov.	5.200	.....
June	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16,850 per long ton; February, £16,031; March, £15,922; April, £15,959; May, £16,725; June, £16,813; July, £16,525; August, £17,109.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	5.932	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April.	5.817	6.078	5.667	5.931	23.813	25.781
May.	5.434	5.997	5.284	5.846	23.594	27.000
June.	5.190	6.096	5.040	5.948	23.875	27.728
July.	5.396	6.006	5.247	5.856	23.938	26.800
Aug.	5.706	6.027	5.556	5.878	24.675	26.938
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.